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Information Collection Rule (ICR) Reference Manual - Understanding the ICR

by

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Acronyms

A-Team	ICR Assistance Team
AOC	assimilable organic carbon
AWWA	American Water Works Association
BOC	Biodegradable organic carbon
CFR	<i>Code of Federal Regulations</i>
D/DBP	disinfectants and disinfection byproducts
DMS	Data Management System
DSE	Distribution System Equivalent
DWS	Drinking Water Section
EBCT	empty bed contact time
EPA	U.S. Environmental Protection Agency
ESWTR	Enhanced Surface Water Treatment Rule
GAC	granular activated carbon
HAA5	Haloacetic Acids-five
HAA6	Haloacetic Acids-six
HAN	Haloacetonitriles
HK	Haloketones
ICR	Information Collection Rule
ISP	Initial Sampling Plan
L	liter
MGD	million gallons per day
µg/L	micrograms per liter
mL	milliliter
NA	not applicable
NPDWR	National Primary Drinking Water Regulations
PE	performance evaluation
PC	personal computer
PWS	public water system
QA	quality assurance
QC	quality control
RAM	random access memory
RBSMT	rapid bench-scale membrane test
RSSCT	rapid small-scale column test
SDS	simulated distribution system
SDWA	Safe Drinking Water Act
SEBST	single element bench-scale test
THM4	Trihalomethanes-four
TOC	total organic carbon
UFCTOX	uniform formation conditions total organic halides



Section 1:

Introduction



Introduction

Purpose of the ICR Reference Manual

This document was developed by the U.S. Environmental Protection Agency (EPA) to provide compliance assistance to public water systems (PWSs) subject to the requirements of the National Primary Drinking Water Regulation (NPDWR) entitled "Monitoring Requirements for Public Drinking Water Supplies: *Cryptosporidium*, *Giardia*, Viruses, Disinfection Byproducts, Water Treatment Plant Data and Other Information Requirements." This regulation is more commonly referred to as the Information Collection Rule, or ICR.

The ICR Reference Manual describes the intent and requirements of the regulation; discusses the responsibilities of those affected; describes other available documents, including the software application developed by EPA for data entry; discusses the issues related to finding or becoming an approved laboratory under the ICR; summarizes available technical assistance; and generally facilitates an understanding of the ICR. It provides the information necessary to meet the requirements under the ICR and directs the reader to other documents developed by EPA that describe certain components of the ICR in more detail.

What is the ICR?

The concept for the ICR arose from discussions of the Regulation Negotiating Committee that convened in 1992 to begin the development of a drinking water regulation to prevent adverse health effects from disinfectants and disinfection byproducts (D/DBPs). The committee, consisting of water industry representatives, environmental groups, environmental health professionals, State regulators, and EPA personnel, stressed the need for "balance" in reducing disinfection. There must be enough reduction to avoid harmful health effects, but not so much that it leads to the increased presence of harmful microbial contaminants. The committee recommended that EPA collect specific monitoring and treatment plant design and operating data from PWSs and use these data to develop subsequent drinking water regulations to control D/DBPs while controlling microbial contamination in drinking water to protect public health.

The information collected under the ICR will be used for the following purposes:

- To identify source water parameters influencing microbial contamination and DBP formation
- To refine models for predicting DBP formation
- To inventory treatment processes currently in use

- To support the development of regulations and guidance to limit pathogen and DBP exposure, in particular the proposed Enhanced Surface Water Treatment Rule (ESWTR) and Stage 2 of the Disinfection Byproducts Rule.

The data collection effort under the ICR lasts a limited time. In general, large utilities (typically serving more than 100,000 people) are required to report data monthly for 18 months. Details on which systems are affected by the ICR and on specific monitoring and reporting requirements are given in Section 2 of this reference manual.

The success of the ICR effort is important to us all—EPA and water utilities strive to deliver the best quality drinking water to the public. There are several steps involved in the implementation of the ICR. **Exhibit 1-1** presents the components of the ICR (from promulgation of the rule to transmission of the data to EPA) that are to be undertaken by EPA, PWSs, and the American Water Works Association (AWWA). **Exhibit 1-2** describes important milestones for ICR requirements. Many of the dates listed are based on a prescribed time period for accomplishing specific tasks; therefore, those dates are deadlines and the tasks can be conducted before those deadlines.

Summary Listing of Essential Documents

You will need the following documents and software package to meet ICR requirements. The document numbers and information on how to obtain these documents and additional "rule by reference" manuals (if you have not received them from EPA) are presented in Section 5 of this reference manual.

- **ICR Water Utility Database System Software and Users' Guide.** All collected data must be submitted to EPA on disk using this software. Each utility's designated ICR contact should have received the software and users' guide along with the notification letter from EPA.
- **An Introduction to the ICR Water Utility Database System.** This 1-hour data entry video describes how to use the ICR Water Utility Database System software. The video will be mailed to PWS ICR contacts as soon as it becomes available.
- **ICR Federal Register Notice.** This should have already been sent by EPA with the Notification Letter. (Note that the ICR incorporates, by reference, five major supporting documents—the *ICR Sampling Manual*, the *DBP/ICR Analytical Methods Manual*, the *ICR Manual for Bench- and Pilot-scale Studies*, the *ICR Microbial Laboratory Manual*, and *Reprints of EPA Methods for Chemical Analyses under the ICR*.)

Organization of This Reference Manual

The ICR Reference Manual is organized as follows:

- Section 2 summarizes the ICR language and requirements.
- Section 3 describes the ICR Water Utility Database System software, its function, how to obtain technical assistance for installing the software, data entry, report generation, and how to submit electronic data to EPA.
- Section 4 describes the technical assistance available from the AWWA ICR Assistance Team (A-Team) and the EPA Safe Drinking Water Hotline. The A-Team will be conducting training in the fall of 1996; additionally the Safe Drinking Water Hotline can answer general questions and send you documents on request.
- Section 5 lists the manuals available, summarizes their content, and explains how to obtain them.
- Section 6 describes the responsibilities of the PWS ICR Technical Coordinator.
- Section 7 discusses the issues related to finding or becoming an approved microbiology or chemistry laboratory and the laboratory reporting software.

Exhibit 1-1: ICR Activities from Promulgation to Start of Sampling

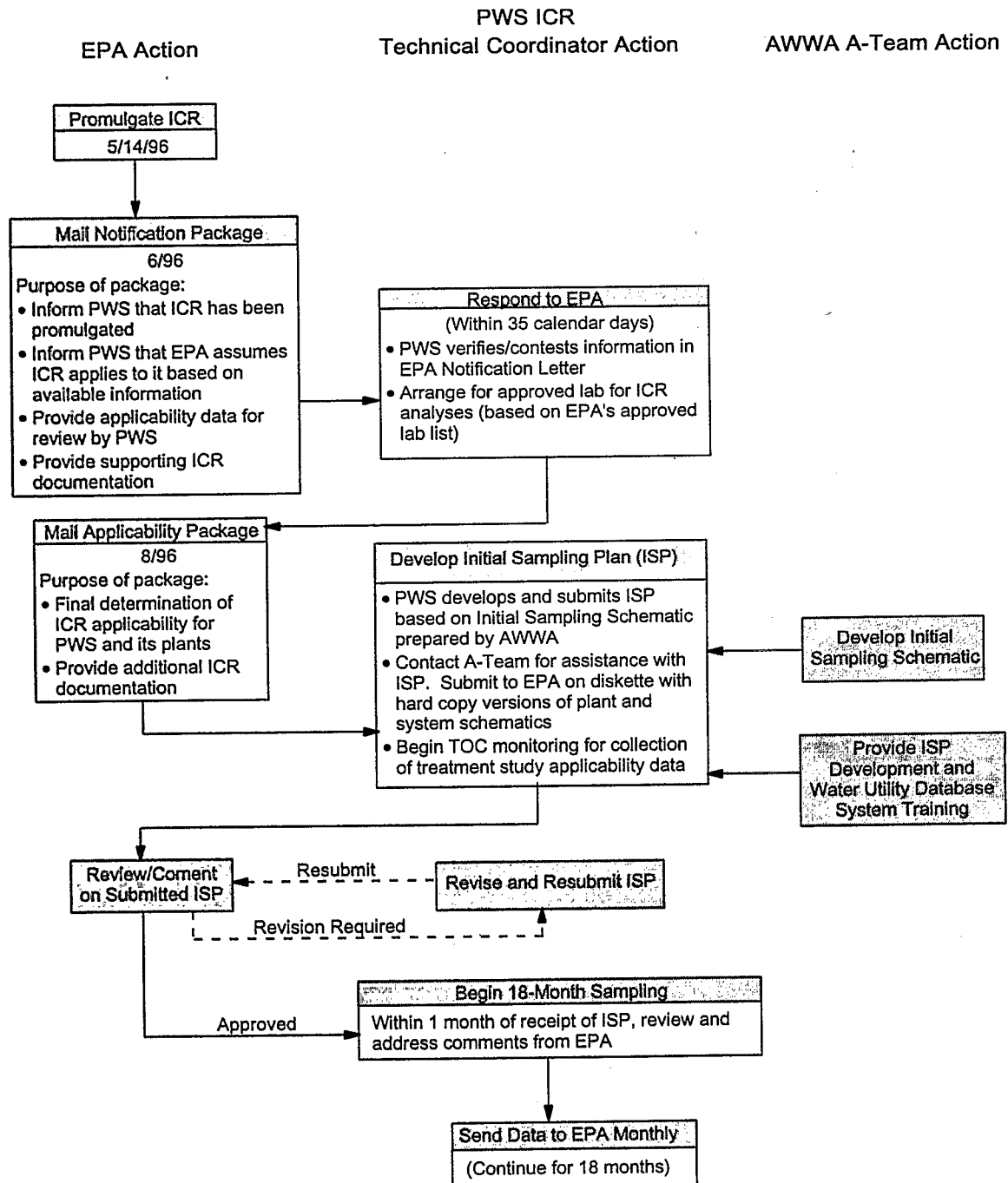


Exhibit 1-2: Important Dates in the ICR

Date	Requirement in Final ICR
January 1, 1994	Virus monitoring forgiveness—monitor for total coliforms, fecal coliforms, or <i>E. coli</i> at influent, at least 5 days/week for 6 consecutive months after January 1, 1994 (p. 24385, col. 2)
May 14, 1996	Publication of the Final ICR in the <i>Federal Register</i> (p. 24368, col. 1)
May 31, 1996	EPA mails Notification Letter to utilities
July 5, 1996	Approximate deadline for utilities to respond to Notification Letter (35 calendar days from receipt of Notification Letter)
July 13, 1996	If a PWS meets the applicability criteria and has not received a Notice of Applicability by 45 days after publication in the <i>Federal Register</i> , it must request a Notice of Applicability from EPA not later than 60 days after publication of the final rule in the <i>Federal Register</i> (p. 24374, col. 2)
August 14, 1996	Effective date of ICR (p. 24368, col. 1)
September 30, 1996 (approximately)	A PWS must begin applicability monitoring no later than the last day of the month following the month that the initial list of approved laboratories is available (expected mid-August 1996) (Letter from William Diamond, July 24, 1996)
November 14, 1996	... laboratories wanting EPA approval, contact EPA not later than November 14, 1996 (p. 24384, col. 1)
Approximately February 1997	Begin monitoring for DBPs and microbial parameters in the calendar month following approval of sampling plans (p. 24374, col. 3)
February 14, 1997	... submit a letter of intent to use grandfathered treatment studies not later than February 14, 1997 (p. 24374, col. 2)
May 14, 1997	... submit a letter of intent to conduct joint treatment studies not later than May 14, 1997 (p. 24374, col. 1)
May 14, 1997	... submit a letter of intent to contribute funds as an alternative to treatment studies not later than May 14, 1997 (p. 24374, col. 2)
June 30, 1997 (if monitoring starts in February 1997)	... submit monthly data from Tables 1–6 and other information on a diskette not later than the fourth month following sampling (p. 24384, col. 1)
October 14, 1997	... submit results of 12 months of TOC and UFCTOX data not later than October 14, 1997 (p. 24387, col. 3)
November 14, 1997	Utilities must submit information for request to avoid treatment studies not later than November 14, 1997 (p. 24374, col. 1)

Date	Requirement in Final ICR
November 14, 1997	... submit a combined application to conduct joint treatment not later than November 14, 1997 (p. 24374, col. 1)
November 14, 1997	... submit application to contribute funds as an alternative to treatment studies not later than November 14, 1997 with TOC/UFCTOX data (p. 24374, col. 2)
November 14, 1997	... submit a combined application to use grandfathered treatment studies not later than November 14, 1997 (p. 24374, col. 2)
April 14, 1998	Begin to conduct precursor removal study no later than April 14, 1998 (p. 24374, col. 3)
July 14, 1999	... submit study precursor removal study reports no later than July 14, 1999 (p. 24374, col. 3)

Section 2:

Understanding the ICR Language



Understanding the ICR Language

Preface

This section of the ICR Reference Manual, Understanding the ICR Language, helps utilities understand the ICR and how its requirements apply to them. The section is divided into the following subsections:

- ICR Definitions
- General Requirements, Applicability, and Schedule for Information Collection (§141.141)
- DBP and Related Monitoring (§141.142)
- Microbiological Monitoring Requirements for Subpart H Systems (§141.143)
- DBP Precursor Removal Studies or Treatment Studies (§141.144)
- Attachment A: Frequently Asked Questions

[Note: All exhibits referenced in the text are presented at the end of their subsection.]

The ICR Definitions subsection reviews the terms and phrases contained in Subpart M of Section 141. The definitions (from subsections 141.2 and 141.140) are arranged by functional group or category (e.g., system components and water types).

The ICR rule outline for each individual section of the rule appears in the beginning of each relevant subsection summary and provides a reference for the rule language. Section summaries closely follow the organization of the rule and provide references to paragraphs in the rule. For example, in the summary for §141.141—General Requirements, Applicability, and Schedule for Information Collection—the citation [(a)(2)(iv)] refers to the numbered paragraph in §141.141 of the rule. The exhibits following these summaries provide additional information (e.g., flowcharts and worksheets) to help the utilities better understand the ICR.

This section attempts to describe the requirements of the ICR in simple terms. However, if a discrepancy should arise between this reference manual and the requirements described in the *Federal Register* of May 14, 1996, the requirements as stated in the *Federal Register* prevail.



ICR Definitions

The following definitions are defined in the ICR rule published in the *Federal Register* on May 14, 1996. The definitions are described in the same manner as in the ICR rule with the addition of examples provided for clarification.

SUBSECTION 141.2 DEFINITIONS

SUBPART H SYSTEMS: PWSs using surface water, or ground water under the direct influence of surface water, as a source are defined as Subpart H systems. Such systems are subject to the requirements of Subpart H of Part 141, also known as the Surface Water Treatment Rule (SWTR).

SUBSECTION 141.140 DEFINITIONS

The following definitions apply only to the requirements of Subpart M (i.e., Information Collection Requirements for PWSs) of this part:

System Components

Intake: A physical location where the PWS takes water from a water resource. Thereafter, the water is under the control of the PWS. For surface water resources, the intake is a structure located in a river, lake, reservoir, or other surface water body. A surface water intake is before any treatment. A ground water intake generally is the location of a well screen in an aquifer. A purchased finished water intake generally is considered to be a water meter between a wholesale and retail system.

Unit Process: A component of a treatment process train that serves a particular treatment purpose for which design and operating information are requested in Table 6c of §141.142 of this subpart (shown in this reference guide as **Exhibit 2-22**). Examples of unit processes include coagulation, sedimentation, and filtration.

Process Train: A number of unit processes connected (e.g., sedimentation and filtration) in series starting from the treatment plant influent and ending with finished water. A particular unit process may be in more than one process train. An example of a process train would be the unit processes comprising conventional treatment (i.e., rapid mix, flocculation, sedimentation, and filtration).

Treatment Plant: A treatment plant consists of one or more process trains that share the same influent water. Treated water from the process trains are combined before entry to the distribution system (or before wholesale to another PWS). Under the ICR, a facility that adds a disinfectant or oxidant to water prior to the distribution system is considered a treatment plant. (Facilities that disinfect ground water and facilities that disinfect purchased finished water are considered treatment plants).

A treatment plant might have several complex process trains, operate with processes built many years apart, and have parallel flow systems with different treatment

processes. Components not considered part of the treatment plant include raw water collection and storage facilities, distribution systems, and components that are not under the control of the PWS.

Treatment System: All treatment plants operated by one treatment system, or PWS. A treatment system can consist of one or several treatment plants with one or multiple intakes (including surface and ground water intakes).

Entry Point to Distribution System: A location in a treatment plant after one or more finished water sample points but before the beginning of the distribution system. A sample collected at this point is usually a blend from more than one treatment plant.

Distribution System: The PWS components of water distribution piping, storage, and booster disinfection under the control of that PWS located after the point where the finished water sample is taken.

Water Types

Water Resource: A body of water before it passes through an intake structure (e.g., upstream in the case of a river). Examples of water resources are rivers, lakes, and aquifers. For a PWS that purchases finished water, the water resource is the wholesale PWS that supplies the purchased finished water; generally, water resources are not under the direct control of a PWS.

Treatment Plant Influent: The water that represents the water quality "challenge" to a particular plant. A sample of treatment plant influent for a PWS that treats untreated water is taken at a location at the upstream end of a treatment plant where waters from all intakes are blended before any treatment or chemical addition. For treatment plants that have multiple intakes and add chemicals at the intake, the sample of treatment plant influent will be a flow proportional composite of intake samples collected before chemical addition and before pretreatment. If the intakes are expected to have the same source-water quality, one representative intake sample may be taken. A sample of treatment plant influent for a PWS that treats purchased finished water is taken at a location just before the purchased finished water is treated.

Finished Water: Treated water that does not undergo further treatment by a treatment plant other than maintenance of a disinfection residual. A sample of finished water is a sample representing the final product water from a particular treatment plant. The sample of finished water will be collected at a point after which all treatment processes for a particular treatment plant are complete (including the clearwell and final point of chlorination) and before the distribution system begins.

Total Finished Water: The flow volume/time—for example, million gallons per day (MGD)—of finished water obtained from all treatment plants operated by a PWS; it includes finished water purchased from other PWSs.

Purchased Finished Water: Finished water purchased by one PWS from another PWS. A sample of purchased finished water will be collected before additional disinfectant is

added to the purchased finished water. For the purpose of Subpart M, a PWS will collect a sample of purchased finished water only if the purchasing PWS re-disinfects.

Sample Types

Haloacetic Acids—Five (HAA5): The concentration, in micrograms per liter (µg/L) rounded to two significant figures, of the following five haloacetic acids—mono-, di-, and trichloroacetic acid; mono- and dibromoacetic acid.

Haloacetic Acids—Six (HAA6): The concentration, in µg/L rounded to two significant figures, of the following six haloacetic acids—mono-, di-, and trichloroacetic acid; mono- and dibromoacetic acid; and bromochloroacetic acid.

Haloacetonitriles (HAN): The concentration, in µg/L rounded to two significant figures, of the following haloacetonitriles—dichloro-, trichloro-, bromochloro-, and dibromoacetonitrile.

Haloketones (HK): The concentration, in µg/L rounded to two significant figures, of the following haloketones—1,1-dichloropropanone and 1,1,1-trichloropropanone.

Distribution System Equivalent (DSE) Sample: A sample collected from the distribution system for comparison with the simulated distribution system (SDS) sample. The DSE sample will be selected using the following criteria: (1) no additional disinfectant is added between the treatment plant and the site where the DSE sample is collected, (2) approximate detention time of water is available, and (3) there is no blending with finished water from other treatment plants.

Trihalomethanes—Four (THM4): The concentration, in µg/L rounded to two significant figures, of the following trihalomethanes—chloroform, bromodichloromethane, dibromochloromethane, and bromoform.

SDS Sample: A finished water sample incubated at the same temperature and detention time of a DSE sample collected from the distribution system. Analytical results of the SDS sample will be compared with the DSE sample to determine how well the SDS sample predicts actual distribution system results.

Miscellaneous

Notice of Applicability: A notice sent via certified mail by EPA to a PWS as notification that EPA believes, based on available information, that the PWS must comply with some or all requirements of Subpart M. The PWS is required to reply to this notice by providing information specified in the notice by the date specified in the notice.

Watershed Control Practice: The protection of a water resource from microbiological contamination before the water enters an intake through measures such as, but not limited to, a watershed control program approved under §141.71(b)(2) of the ICR.



Outline: ICR §141.141—General Requirements, Applicability, and Schedule for Information Collection

ICR FR Page and Column (Reference Manual Page)

- (a) **General Requirements** 24369, col. 1 (2-11)
 - (1) Purpose/Fulfillment of Requirements
 - (2) Basis of Applicability Determinations
 - (3) Multiple Wells from Same Aquifer Considered Single Treatment Plant
 - (i) Sampling
 - (ii) Table 6 for each sampled well
 - (4) GWUDI (classified by the State) as SW Sources
- Appendix A 24369, col. 2 (2-12)
 - Purpose
 - Period of Applicability Determination
 - Applicability Determination
 - Data from Operational Records
 - Calculated Values
 - Treatment Plant Categorization
- (b) **Applicability** 24371, col. 1 (2-14)
 - (1) Treatment Plant Categorization
 - (2) Subsequent Monitoring Applicability
- (c) **Disinfection Byproduct and Related Monitoring** 24372, col. 1 (2-17)
- (d) **Microbiological Monitoring** 24372, col. 3 (2-17)
- (e) **Disinfection Byproduct Precursor Removal Studies
(Treatment Studies)** 24372, col. 1 (2-18)
 - (1) PWS Applicability for Treatment Studies 24372, col. 1 (2-19)
 - (i) Exception for treatment plants according to (e)(3)
 - (ii) Exception for treatment plants according to (e)(4)
 - (iii) Exception for treatment plants according to (e)(5)
 - (iv) Exception for treatment plants according to (e)(6)
 - (v) Exception for treatment plants operated by PWS using
the same water resource as set forth in (e)(4)
 - (2) Treatment Study Applicability Monitoring 24372, col. 2 (2-19)
 - (i) TOC monitoring
 - (ii) THM4 and HAA5 monitoring
 - (iii) Total organic halides formed under the uniform formation conditions
(UFCTOX) monitoring
 - (3) Criteria Under Which No Treatment Study Is Required . . 24372, col. 3 (2-20)

- (i) At treatment plants using chlorine as both primary and residual disinfectant with annual average (of four quarterly averages) levels of <40 mg/L for THM4 and <30 mg/L for HAA5 respectively
 - (ii) At treatment plants using SW with a TOC level ≤ 4.0 mg/L in the treatment plant influent
 - (iii) At treatment plants using GW (not GWUDI) with TOC level ≤ 2.0 mg/L in finished water
 - (iv) At treatment plants already using full scale GAC or membrane technology
- (4) Criteria Under Which Joint Treatment Studies Are Allowed 24373, col. 1 (2-21)
 - (i) PWSs using common water resources with similar treatment trains
 - (A) River resources
 - (1) Intakes within 20 miles of each other and TOC at each influent within 10% of mean TOC for all influents
 - (2) Intakes at least 20 river miles apart, but no farther than 200 river miles and mean water resource UFCTOX is within 10% of mean UFCTOX for all influents
 - (B) Lake/reservoir resources
 - (C) GW resources not under the direct influence of SW
 - (ii) Joint study requirements
- (5) Alternative to Conducting Treatment Study 24373, col. 3 (2-22)
 - (i) Contribution of funds to cooperative research effort
 - (ii) Contribution due date
- (6) Criteria for Acceptable Grandfathered Studies 24373, col. 3 (2-22)
 - (i) Analytical methods and analytical and quality control procedures used
 - (ii) Protocol used
- (7) Provision of Information for Obtaining Approval of Criteria Applicability 24374, col. 1 (2-23)
 - (i) Approval of request to avoid treatment studies
 - (ii) Approval of request to conduct joint studies
 - (A) Proof of common source designation
 - (B) Demonstration of similar treatment trains
 - (C) Proof that PWSs are in same size category
 - (D) TOC results from first 6 months of monitoring
 - (E) Description of studies to be conducted
 - (F) Additional supporting data
 - (iii) Approval of request for alternative to treatment studies
 - (iv) Approval of request to use grandfathered studies
- (f) **Effective Dates** 24374, col. 2 (2-25)
 - (1) Notice of Applicability
 - (2) Simultaneous Start for PWSs Required to Comply with §141.142 (Disinfection Byproducts and Related Monitoring) and §141.143 (Microbiological Monitoring)
 - (3) Disinfection Byproduct and Related Monitoring
 - (4) Microbiological Monitoring

- (5) DBP Precursor Removal Studies
 - (i) TOC, UFCTOX, THM4, and HAA5 monitoring
 - (ii) Dates



Section Summary: ICR §141.141—General Requirements, Applicability, and Schedule for Information Collection

The purpose of the ICR is to establish specific data collection requirements for PWSs. The final ICR was published in the *Federal Register* on May 14, 1996. This notice finalizes requirements for the monitoring of microbial contaminants and DBPs by “large” PWSs (i.e., $\geq 100,000$ people served). It also requires large PWSs to provide operating data, describe their treatment plant design, and conduct either bench- or pilot-scale testing of advanced treatment techniques.

This section of the rule, General Requirements and Schedule for Information Collection, explains the general requirements of the ICR; the applicability to DBP, microbiological, and DBP Precursor Removal Study requirements; and the effective dates for monitoring. To facilitate the understanding of the rule, much of its information is presented in tabular form. In addition, there are several technical manuals that efficiently communicate the detailed requirements of the ICR to those who are responsible for implementing the regulations. These technical manuals are referenced throughout this rule summary and in Section 5: Summary of Additional References.

Categorization worksheets (**Exhibits 2-1 and 2-2**) were developed for this section to let users capture system data by treatment plant. These data were used to determine the ICR applicability for each treatment plant in a system using the flow chart in **Exhibit 2-3** or the table in **Exhibit 2-4**. Use of the categorization worksheets is described under the applicability portion of this section. Please use the categorization worksheets (one per treatment plant) and flowchart as you work through this section.

The remainder of this subsection provides a summary of ICR §141.141, General Requirements and Schedule for Information Collection. All referenced exhibits are presented at the end of this subsection.

(a) GENERAL REQUIREMENTS

The ICR was developed to collect both microbial and DBP occurrence, exposure, and treatment data from large PWSs for a specified time period. PWSs may discontinue ICR-related monitoring once all of their requirements have been fulfilled. [(a)(1)] A PWS's ICR applicability can be determined by following the steps detailed in Appendix A of the regulation, which are summarized later in this subsection. [(a)(2)]

For applicability purposes, there are several conditions where PWSs with multiple intakes using ground water are considered a single treatment plant. PWSs meeting either of the following conditions are considered to have a single treatment plant and must monitor accordingly:

- PWSs that draw from multiple wells in the **same** aquifer and have no central treatment plant.
- PWSs that draw water from multiple wells in **multiple** aquifers that are treated in the same treatment plant. [(a)(3)]

In these cases, sampling should be conducted at the well with the largest flow and at the same well each month. [(a)(3)(i)]

For the purpose of determining ICR requirements, ground water sources under the direct influence of surface water, as classified by the State no later than May 14, 1996, are to be considered **surface** water sources. [(a)(4)]

APPENDIX A OF THE REGULATION

Appendix A of the ICR describes how to determine whether the ICR requirements are applicable to individual PWSs. This determination should be made by PWSs in response to EPA's Notification Letter distributed in June 1996 to all PWSs EPA believes are required to provide data under the ICR. PWSs then have 35 days to respond to EPA regarding applicability. By the time this reference manual is made available to PWSs, the applicability determination will most likely have been made. Nevertheless, the process and calculations for applicability are given in this summary.

To account for both retail **and** wholesale populations served by treated water produced by a PWS, and to determine specific monitoring requirements for each treatment plant operated by the PWS, a PWS must calculate the population served by its entire system and each of its treatment plants. Under the ICR, a treatment plant includes any site where a disinfectant or oxidant is added to the water prior to the water entering the distribution system (e.g., a chlorinator at a well).

Appendix A of the ICR is to be used by PWSs to characterize their treatment plants according to the relative flow provided and population served by its water resources. The ICR is complex and assigning treatment plant categories (i.e., A,B,C,D,E,F, and G) facilitates understanding of the applicability to the various ICR requirements. A PWS that serves no retail population (i.e., wholesale only) is required to use an EPA-derived equation to calculate the wholesale population equivalent served to determine the applicability for the treatment plants within the PWS.

The two worksheets in **Exhibits 2-1** and **2-2** were developed to help utilities determine treatment plant category assignments. The categorization worksheet in **Exhibit 2-1** may be used to calculate the treatment plant population information necessary for determining the ICR category assignment for each treatment plant in a PWS. The PWS summary sheet in **Exhibit 2-2** provides a place to capture all the information for the PWS and each of the treatment plants. Once this information is determined, the treatment plant category determination flowchart in **Exhibit 2-3** or the table in **Exhibit 2-4** can be used to determine the ICR category assignments.

The three basic steps in determining applicability follow:

■ **Step 1:** Collection of necessary operational data, including:

- P_R , the retail population served
- F_N , the amount of treated water purchased from other PWSs but not further treated, in MGD
- F_W , the amount of finished water sold to other PWSs, in MGD
- $F_{S\#}$, the amount of surface water treated at plant #, in MGD
- $F_{G\#}$, the amount of ground water treated at plant #, in MGD
- $F_{P\#}$, the amount of treated water purchased from another PWS that is further treated prior to the entry point to the distribution system, in MGD.

■ **Step 2:** Calculation of population equivalents per water resource type

In general, the treated flow values, F , are converted into population equivalents, P , using a conversion factor, K , by the following equation:

$$P = F/K$$

K , the PWS-specific per capita finished water usage rate, is determined according to the following equation:

$$K = (F_{CT} + F_N - F_W)/P_R$$

To calculate K , the finished water produced in all of the PWS's treatment plants (F_{CT}) must be determined. F_{CT} is determined by summing the combined flows for each treatment plant operated by the PWS, as follows:

$$F_{CT} = \sum F_{C\#}, \text{ where } F_{C\#} = F_{S\#} + F_{G\#} + F_{P\#}$$

■ **Step 3:** Categorization of each treatment plant.

PWSs may use **Exhibits 2-3** and **2-4** to determine which of the seven possible ICR categories (A through G) and subsequent requirements apply to each of their treatment plants, after the following population equivalents have been determined:

- $P_{S\#}$, the treatment plant surface water population served
- $P_{G\#}$, the treatment plant ground water population served
- $P_{C\#}$, the treatment plant combined population served
- P_{CT} , the PWS combined population served.

If a PWS sells all of its finished water and has no retail population (P_R) the PWS is to determine its population served as follows:

$$\text{PWS population served} = 7,700 (\text{PWS's average treated flow in MGD})^{0.95}$$

Note: This equation was developed from hundreds of data points from the relationship between flow and population served.

At this point, each treatment plant's population served can be calculated according to the equation:

$$\text{Treatment plant population served} = \frac{\text{PWS population served} \times \text{treatment plant flow}}{\text{PWS average treated flow}}$$

Use **Exhibits 2-1** through **2-4** and the above descriptions to determine the treatment plant category for each treatment plant in your PWS.

Applicability is to be determined from PWS population records calculated as annual averages of the 12 calendar months of 1995. Flow values are monthly or annual averages expressed in MGD. If a treatment system or plant was not in operation for a month or more in 1995 because of a natural disaster or construction/maintenance, applicability determinations are to be based on those months in 1995 when the system or plant was operational plus the months from 1994 that are representative of the inoperable ones from 1995. If a treatment system or plant was inoperable as a result of a seasonal reduction in demand for finished water, then those months are to be included in the calculation of annual population averages as zeros. If the treatment system or plant's total operational lifetime was less than 12 months by December 1995 (e.g., a new plant) or if the PWS purchases all of its water from other PWSs and does not further treat its water, compliance with the ICR is **not** required.

EXAMPLE CATEGORIZATION

The purpose of this example is to illustrate the determination of PWS treatment plant categorizations using the worksheets provided in **Exhibits 2-1** and **2-2**. Handwritten examples were completed in this example to reflect how a system would prepare these worksheets.

In this example, City A has two treatment plants with surface, ground, and purchased water sources, and a distribution system. The first treatment plant, called Name1, has a 3 MGD surface water source and a 7 MGD ground water source that are blended and treated in a 10 MGD treatment plant. The second treatment plant, called Name2, is a 15 MGD plant and has a 10 MGD ground water source and treats 5 MGD of purchased untreated water.

City A buys an additional 2 MGD of finished water from another PWS. The PWS for City A also wholesales 5 MGD to another city. The retail population served by City A is 250,000.

The categorization process involves completing the worksheets in **Exhibits 2-1** and **2-2** for the two treatment plants and the PWS. Completed categorization worksheets are provided in **Exhibits 2-1a** and **2-1b** for the two treatment plants and in **Exhibit 2-2a** for the summary of the PWS. In **Exhibits 2-1a** and **2-1b**, the first part involves determining the retail population, purchased and wholesale flows, and the combined flow for the system. Note that information in this part is shared between the two worksheets. In part 2, the conversion factor is calculated, which has the same value for all treatment plants in the PWS. Under part 3, the treatment plant populations are calculated based on the conversion factor. These populations are transposed to the summary sheet (**Exhibit 2-2a**).

The treatment plant category can be determined using the flow chart in **Exhibit 2-3** which is based on the criteria in **Exhibit 2-4**.

(b) APPLICABILITY

The seven treatment plant categories derived using Appendix A of the ICR (i.e., categories A through G) are shown in **Exhibit 2-4**. Brief descriptions of these seven treatment plant categories and their applicability to the various ICR monitoring requirements follow:

Category A

■ **Qualifying Criteria**

- PWS has a combined population served of $\geq 100,000$;
- Treatment plant has a combined population served of $\geq 100,000$; and
- Treatment plant has a surface water population served of ≥ 1 .

■ **Applicable Requirements**

- DBP and related monitoring per §141.142;
- Microbiological monitoring per §141.143;
- Treatment study applicability monitoring per §141.144; and
- Bench- or pilot-scale treatment studies per §141.144 (pilot-scale required for treatment plants with a population served $\geq 500,000$).

Category B

■ **Qualifying Criteria**

- PWS has a combined population served of $\geq 100,000$;
- Treatment plant has a combined population served of $\geq 100,000$; and
- Treatment plant has a surface water population served of zero.

■ **Applicable Requirements**

- DBP and related monitoring per §141.142;
- Treatment study applicability monitoring per §141.144; and
- Bench- or pilot-scale treatment studies per §141.144 (pilot-scale required for treatment plants with a population served $\geq 500,000$).

Category C

■ **Qualifying Criteria**

- PWS has a combined population served of $\geq 100,000$;
- Treatment plant has a combined population served of $< 100,000$;
- Treatment plant is the PWS's largest
- Treatment plant has a surface water population served of ≥ 1 .

■ Applicable Requirements

- DBP and related monitoring per §141.142;
- Microbiological monitoring per §141.143 ;
- Treatment study applicability monitoring per §141.144;
- Bench- or pilot-scale treatment studies per §141.144.

Category D**■ Qualifying Criteria**

- PWS has a combined population served of $\geq 100,000$;
- Treatment plant has a combined population served of $<100,000$;
- Treatment plant is the PWS's largest; and
- Treatment plant has a surface water population served of zero.

■ Applicable Requirements

- DBP and related monitoring per §141.142;
- Treatment study applicability monitoring per §141.144; and
- Bench- or pilot-scale treatment studies per §141.144.

Category E**■ Qualifying Criteria**

- PWS has a combined population served of $\geq 100,000$;
- Treatment plant has a combined population served of $<100,000$;
- Treatment plant is not the PWS's largest; and
- Treatment plant has a surface water population served of ≥ 1 .

■ Applicable Requirements

- DBP and related monitoring per §141.142; and
- Microbiological monitoring per §141.143.

Category F**■ Qualifying Criteria**

- PWS has a combined population served of $\geq 100,000$;
- Treatment plant has a combined population served of $<100,000$;
- Treatment plant is not the PWS's largest;
- Treatment plant has a surface water population served of zero; and
- Treatment plant has ground water population served of $<100,000$.

■ Applicable Requirements

- DBP and related monitoring per §141.142.

Category G**■ Qualifying Criteria**

- PWS has a combined population served between 50,000 and 99,999;
- PWS has a ground water population served of $\geq 50,000$; and
- Treatment plant is the PWS's largest ground water plant.

■ Applicable Requirements

- Treatment study applicability monitoring per §141.144; and
- Bench- or pilot-scale treatment studies per §141.144.

(c) DBP AND RELATED MONITORING

Under the ICR, utilities will monitor for a number of categories of parameters related to disinfection byproducts. One category is organic and inorganic materials that occur in water entering water treatment plants, because these materials react with disinfectants to form byproducts. A second category is the amount of disinfectant that remains after treatment and that is available to react with the organic materials to form byproducts. A third category is the byproducts themselves. These byproducts vary depending on the disinfectant being used. These data will provide information on the relationship between the amount and type of organic material in the water, the amount of disinfectant used, and the degree of byproduct formation.

PWSs affected by this requirement must conduct monthly monitoring for DBPs, DBP precursors, and other chemical parameters at each treatment plant and in the distribution systems. These PWSs are also required to characterize treatment processes (e.g., sedimentation and filtration) in the treatment plant on a monthly basis for 18 months. PWSs receiving all of their water from a supplier and **not** further disinfecting that water at the entrance to the distribution system are **not** required to conduct any monitoring under this rule.

Treatment plants in categories A, B, C, D, E, and F (discussed previously) are subject to the DBP and related monitoring requirements specified in §141.142, as presented in **Exhibit 2-5** and below:

- Category A, B, C, D, and E treatment plants are to monitor for 18 consecutive months, **even** if a treatment plant was not used for one or more calendar months. If the treatment plant is not being used, only treatment plant influent monitoring needs to be conducted.
- Category F treatment plants are also to monitor for 18 consecutive months **unless** a treatment plant was not used for one or more calendar months.

The section summary for §141.142 presents detailed information about DBP requirements. For the months when a treatment plant is not operational, the monthly report required under §141.142(c) must still be submitted, but should indicate zero flow.

(d) MICROBIOLOGICAL MONITORING

Under the ICR, utilities will monitor for representative bacteria, viruses, and protozoa over an 18-month period. These data are needed to develop national occurrence estimates of the presence and levels of microbial contamination in water entering water treatment plants. Microbiological monitoring requirements for surface water plants include monitoring for disease-causing microorganisms, such as *Cryptosporidium* and *Giardia*, and total culturable viruses.

Treatment plants in categories A, C, and E must conduct microbiological monitoring once a month as specified in §141.143 and summarized in **Exhibit 2-6**. Treatment plants are required to conduct 18 consecutive months of monitoring, even if the plant is not used every month.

PWSs must conduct finished water monitoring at any treatment plant where 10 or more *Giardia* cysts, 10 or more *Cryptosporidium* oocysts, or one or more total culturable viruses (per liter of water) are detected during the first 12 months of monitoring. The PWS must analyze finished water samples for the same organisms as those sampled in source water until 18 months of **source** water microbial monitoring are completed. Consult the section summary for §141.143 in this reference manual for detailed information about microbiological monitoring requirements.

To be eligible for **reduced** monitoring, a PWS must notify EPA in its response to the EPA Notice of Applicability of its plans to conduct reduced monitoring, which is available under the following provisions:

- A PWS may **avoid** the requirement to conduct finished water monitoring of *Cryptosporidium* and *Giardia* by complying instead with alternative monitoring requirements, including particle counting at several locations within the treatment plant (see §141.143(a)(2)(iii) for details).
- A PWS may **avoid** virus monitoring if the PWS has monitored for total coliforms, fecal coliforms, or *E. coli* in the treatment plant influent for at least 5 days a week for a consecutive 6-month period beginning after January 1, 1994 and if 90 percent of all samples taken contain no more than 100 total coliforms/100 milliliters (mL), 20 fecal coliforms/100 mL, or 20 *E. coli*/100 mL (see §141.143(a)(2)(iv) for details).

(e) DBP PRECURSOR REMOVAL STUDIES (TREATMENT STUDIES)

Under the ICR, some utilities will be required to perform bench- or pilot-scale studies on one of two types of treatment: granular activated carbon (GAC) or membrane processes. These studies will be used to judge the effectiveness of these technologies in reducing the levels of byproduct formation and the associated cost.

In general, treatment study applicability monitoring requires monitoring for total organic carbon (TOC) for 12 consecutive months. To determine which treatment plants will be required to conduct bench and/or pilot-scale testing, PWSs are required to conduct treatment study applicability monitoring according to the following requirements:

- PWSs must monitor for TOC in the influent of each treatment plant that treats surface water and serves a population of 100,000 people or more.
- For treatment plants serving a population of 100,000 people or more and using only ground water as the source, TOC monitoring must be conducted on finished water.
- For PWSs that serve at least 100,000 people but have no individual treatment plant serving 100,000 or more, TOC monitoring must be conducted at the treatment plant serving the largest population. PWSs serving at least 50,000 people but less than 100,000 (with at least 50,000 served by ground water) are required to monitor finished water TOC at the treatment plant serving the largest population.
- A PWS operating multiple treatment plants using a common source is required to conduct only one treatment study for those treatment plants.

Exhibit 2-7 summarizes the treatment plant applicability monitoring and treatment study requirements. Refer to the §141.144 Section Summary for detailed information about treatment study requirements.

(1) PWS Applicability for Treatment Studies

At each treatment plant in categories A, B, C, D, and G, a PWS must conduct treatment study applicability monitoring as discussed in (2) Treatment Study Applicability Monitoring of the ICR and in the appropriate treatment studies per §141.144, except for treatment plants that meet any of the following criteria:

- Satisfy the “no treatment study” required criteria under (e)(3) of this section. [(e)(1)(i)]
- Meet the common water resource criteria for conducting **joint treatment studies** under (e)(4) of this section. [(e)(1)(ii)]
- Meet the common water resource criteria in paragraph (e)(5) of this subsection and contribute funds toward research in lieu of conducting a treatment study (the “buyout” option). [(e)(1)(iii)]
- Have previously conducted a treatment study that satisfies the conditions in “grandfathered studies” under (e)(6) of this section. [(e)(1)(iv)]

(2) Treatment Study Applicability Monitoring

- **TOC.** Treatment plants in categories A, B, C, D, and G must monitor TOC monthly for 12 months. Treatment plants using surface water (i.e., A and C) must monitor

treatment plant influent and those using ground water (i.e., B, D, and G) must monitor finished water. [(e)(2)(i)]

- **THM4 and HAA5.** Only treatment plants that want to avoid conducting treatment studies based on their use of chlorine as the primary and residual disinfectant and their annual average level of THM4 <40 µg/L and HAA5 <30 µg/L need to conduct THM4 and HAA5 treatment study applicability monitoring. Annual average levels of THM4 and HAA5 are determined by averaging the four distribution system sample averages collected under the quarterly DBP monitoring requirements of §141.142(a)(1). [(e)(2)(ii)]
- **UFCTOX.** Total organic halides formed under the uniform formation conditions (UFCTOX) monitoring is only required of treatment plants seeking (1) to qualify for a joint treatment study on the basis of having river intakes between 20 and 200 miles apart with a mean water resource UFCTOX within 10 percent of the mean UFCTOX of all the treatment plant influents (based on UFCTOX analytical results of the same 12 months for all participating treatment plants) or (2) to qualify for the contributing funds alternative to conducting a treatment study, which requires a common water resource designation as determined in Joint Treatment Studies under (e)(4) of this section. [(e)(2)(iii)]

(3) No Treatment Study Required

If **any** of the following conditions are true of a treatment plant, then the PWS does not need to perform a treatment study at that particular treatment plant, as long as the required information has been submitted to EPA no later than November 14, 1997 (18 months after the publication of the final rule):

- **Plants Can Avoid Treatment Studies on the Basis of TOC.** Treatment plants using surface water with a treatment plant influent TOC annual average of less than or equal to 4.0 mg/L, determined by averaging the initial 12 monthly TOC samples obtained through DBP monitoring. [(e)(3)(ii)] Treatment plants using only ground water (not under the direct influence of surface water) that has a finished water TOC annual average of less than or equal to 2.0 mg/L, determined by averaging the initial 12 monthly TOC samples attained through DBP monitoring. [(e)(3)(iii)]
- **Plants Can Avoid Treatment Studies on the Basis of THM4 and HAA5.** Treatment plants using chlorine as both the primary and residual disinfectant with levels of <40 µg/L for THM and <30 µg/L for HAA5. THM4 and HAA5 levels are to be determined as annual averages of four quarterly averages, which are the arithmetic average of the four distribution samples collected under DBP monitoring requirements. [(e)(3)(i)]
- **Plants Can Avoid Treatment Studies If They Use Full-Scale Membrane or GAC.** Treatment plants that already use full-scale GAC or membrane technology **and** are capable of achieving precursor removal. Achieving precursor removal requires the following:

- For GAC technology, an empty bed contact time (EBCT) of greater than or equal to 15 minutes with a time between carbon reactivation or replacement of not more than 9 months (if these criteria are not met but effective DBP precursor removal can be demonstrated, PWSs may still apply to avoid treatment studies)
- For membrane technology, nanofiltration or reverse osmosis membranes.

The PWS must conduct monitoring and submit full-scale plant data as required by §141.142 DBP monitoring (the GAC or membrane process must be included in the sampled process train). [(e)(3)(iv)]

(4) Joint Treatment Studies

PWSs that use common water resources and similar treatment trains (e.g., both are conventional filtration treatment plants or both are softening plants) may conduct joint treatment studies with other PWSs.

To qualify as using a common water resource, the mean TOC or UFCTOX value for each of the treatment plants involved must be within ± 10 percent of the average of all the treatment plants (TOC or UFCTOX values are to be calculated using the monthly treatment plant influent data for surface water resources or finished water data for ground water resources collected during the 12 months of applicability monitoring) and the following requirements for that type of water resource must be met: [(e)(4)(i)]

■ For river sources, either:

- The intakes are within 20 river miles of each other and TOC at each treatment plant influent is within ± 10 percent of the mean TOC for all the treatment plant influents. [(e)(4)(i)(A)(1)]

OR

- The intakes are greater than or equal to 20, but less than 200, river miles apart and the mean water resource UFCTOX is within ± 10 percent of the mean UFCTOX for all treatment plant influents, based on UFCTOX analytical results of the same 12 months for all participating treatment plants. [(e)(4)(i)(A)(2)]
- For lake/reservoir intakes, the same lake or reservoir must serve all cooperating treatment plants and TOC at each treatment plant influent is within 10 percent of the mean TOC for all the treatment plant influents. [(e)(4)(i)(B)]
- For ground water not under the direct influence of surface water, the treatment plants must have intakes from a single aquifer and finished water TOC at each treatment plant within 10 percent of the mean finished water TOC for all the treatment plants. [(e)(4)(i)(C)]

The types and number of studies to be conducted are contingent on the size of the treatment plant and the number of participating treatment plants (see **Exhibits 2-8** and

2-9). Treatment plants are split into two size categories—those with populations served of <500,000 and those with populations served of ≥500,000; joint studies can be conducted only among treatment plants in the same category. No more than three treatment plants that each have a population served of ≥500,000 can join together to conduct treatment studies; no more than six treatment plants serving populations of <500,000 can form a cooperative. [(e)(4)(ii)]

(5) Alternative to Treatment Studies

In lieu of conducting treatment studies, a PWS may opt to contribute funds to a Disinfection Byproducts/Microbial Research Fund (termed the buyout option). This fund will be a cooperative research effort. Buyout options may be used by treatment plants if they meet both the following criteria:

- They use a common water resource
- A treatment study is being conducted by another PWS or cooperative operating on the common source.

A treatment plant serving 500,000 persons or more cannot buy out unless a plant within the cooperative, serving 500,000 persons or more, is conducting a **pilot-scale** study on the common source. A treatment plant serving less than 500,000 persons can buy out if either a bench-scale or a pilot-scale study is being conducted on the common source. An approved grandfathered study can be used as justification for contributing to the cooperative research effort.

Funds will be contributed to the Disinfection Byproducts/Microbial Research Fund, and will be administered by the AWWA Research Foundation under the direction of an independent research council. The funds will be used to research disinfectants, disinfection byproducts, and enhanced surface water treatment issues. The contribution is \$300,000 for treatment plants serving ≥500,000 people and \$100,000 for those serving <500,000. [(e)(5)(i)] Funds are to be sent to the address provided in the approval letter no later than 90 days after EPA grants the waiver.

PWSs must submit an application (and show that they meet the previously mentioned buyout option criteria) to EPA at the following address:

ICR Precursor Removal Studies Coordinator
EPA – Technical Support Center
26 W. Martin Luther King Drive
Cincinnati, OH 45268.

(6) Grandfathered Studies

If a PWS has already conducted precursor removal studies using activated carbon or membrane technology (nanofiltration or reverse osmosis), the PWS may use the results of those studies to fulfill ICR treatment study requirements, if both the following criteria are met:

- The analytical methods specified in Table 7 of §141.142(b)(1) and the analytical and quality control procedures described in *DBP/ICR Analytical Methods Manual* (EPA 814-B-94-002) were used. [(e)(6)(i)]
- A protocol similar to that specified in the reference guide titled *ICR Bench- and Pilot-scale Treatment Study Guidance Manual* (EPA 814-B-96-003) was followed and the requested data provided. [(e)(6)(ii)]

(7) Obtaining Approval of Criteria Applicability

PWSs interested in avoiding treatment study requirements under any of the following four provisions must submit an application containing the specified information to EPA at the following address:

ICR Precursor Removal Studies Coordinator
EPA – Technical Support Center
26 W. Martin Luther King Drive
Cincinnati, OH 45268.

On the Basis of the No Study Required Provisions

The PWS must submit information supporting the criterion in No Treatment Study Required under (e)(3) of this section, including any pilot or full-scale data showing effective precursor removal. Applications are to be submitted by November 14, 1997. If a PWS that initially intended to conduct joint treatment studies, to comply with the alternative to treatment studies, or to submit a grandfathered study decides to avoid a treatment study under any of the no study required provisions, then that PWS must notify any other PWSs that were associated with the previously submitted application. [(e)(7)(i)]

On the Basis of the Joint Treatment Study Provisions

By May 14, 1997 (i.e., 12 months after publication of the final rule), the PWS must submit a "letter of intent" to EPA signed by all participating PWSs to conduct joint treatment studies. The purpose of the letter of intent is to provide early notification to EPA of the interest of the participating PWSs and to allow EPA to begin reviewing the supporting information. All participating PWSs should understand that the letter of intent is not binding; if the results of 12 months of TOC or THM4 and HAA5 monitoring at a plant indicate that it can avoid conducting studies based on one of the exclusions, that plant does not need to participate in a joint treatment study. Also, if the results of 12 months of TOC or UFCTOX monitoring do not support the common source designation, the systems will not be allowed to conduct joint studies.

The letter of intent must include the following information for each plant to be included:

- Proof of a common water resource designation [(e)(7)(ii)(A)]
- Demonstration of similar treatment trains [(e)(7)(ii)(B)]

- Proof of same size category [(e)(7)(ii)(C)]
- Treatment plant influent TOC, finished water TOC, or UFCTOX results from the first 6 months of monitoring [(e)(7)(ii)(D)]
- Description of type of studies to be conducted [(e)(7)(ii)(E)]
- Any additional supporting data. [(e)(7)(ii)(F)]

A combined application for joint studies approval, including 12 months of treatment plant influent TOC, finished water TOC, or UFCTOX monitoring results from each treatment plant, is to be submitted to EPA by all participating PWSs by November 14, 1997 (i.e., 18 months after publication of the final rule). [(e)(7)(ii)] EPA will review this application and notify the plant cooperative whether the joint study is approved or disapproved.

On the Basis of the Alternative Fund Contribution Provision

If a PWS believes that it qualifies to “buy out” of the treatment study requirement, it must submit a letter of intent to contribute funds to the Disinfection Byproducts/Microbial Research Fund no later than May 14, 1997 (i.e., 12 months after the publication of the final rule). The letter must identify the other treatment plants using the same water resource that will be conducting treatment studies.

Each treatment plant must submit an application for alternative approval that includes 12 months of treatment plant influent TOC, finished water TOC, or UFCTOX monitoring results by November 14, 1997 (i.e., 18 months after the publication of the final rule). It is possible, however, that the PWS may not be able to qualify for the buyout option and may be required to conduct treatment studies if there are no other appropriately sized treatment plants using the same water resource that are planning to conduct treatment studies. [(e)(7)(iii)]

Approval cannot be final until EPA has confirmed that a treatment study is being conducted by another plant on the common source. EPA will notify the PWS if it can avoid the study by contributing funds to the Disinfection Byproducts/Microbial Research Fund. Information will be provided in the notification of approval on the mechanism for contributing funds to the research fund. The PWS must make the contribution no later than 90 days after notification by EPA that the buyout application is approved.

On the Basis of the Grandfathered Study Provision

If a PWS is interested in qualifying for the “grandfathered study” provision, the following information is to be submitted to EPA by February 14, 1997 (i.e., 9 months after the publication of the final rule):

- A description of the study
- The equipment used
- The experimental protocol
- The analytical methods

- The quality assurance plan
- Any reports resulting from the study.

By November 14, 1997 (i.e., 18 months after the publication of the final rule), the PWS must submit the study data specified in *ICR Manual for Bench- and Pilot-scale Treatment Studies* (EPA 814-B-96-003). An approved grandfathered treatment study can be used for avoidance under the alternative fund contribution provision, summarized on page 2-22. To apply an approved grandfathered study to the joint treatment studies provisions, the study must satisfy the joint treatment studies criteria summarized on page 2-21 and the PWS that conducted the study must submit written concurrence.

(f) EFFECTIVE DATES

Notification

In June 1996, EPA notified PWSs that it believed were subject to the ICR rule. Upon receipt of a Notice of Applicability letter from EPA, a PWS had 35 calendar days to inform EPA of what ICR requirements apply to each treatment plant within the system. If a PWS meets ICR applicability criteria (as specified in Appendix A of the final rule and in this section summary) but did not receive a Notice of Applicability from EPA by June 28, 1996, that PWS should have contacted EPA at the following address by July 13, 1996: [(f)(1)]

ICR Utilities Coordinator
EPA – Technical Support Center
26 W. Martin Luther King Drive
Cincinnati, OH 45628.

PWSs that have not received a Notice of Applicability from EPA and/or have not responded to EPA by July 13, 1996, should do so immediately.

PWSs that are required to conduct DBP and microbiological monitoring must begin monitoring for both in the same month and submit their DBP and microbiological sampling plans at the same time. [(f)(2)]

Sampling Plans

PWSs must submit initial sampling plans to EPA for review and approval no later than 8 weeks after receiving the final applicability letter from EPA in August 1996. The initial sampling plan must be developed by the utility for each treatment plant affected by the ICR and will include the plant design parameters for each unit process in each process train for each treatment plant, the location of each sampling point, and the analytical parameters to be monitored at each sampling point. The *ICR Water Utility Database System and Users' Guide* contains data entry worksheets that will aid in the collection and entry of the plant design parameters. The data entry software will be used to develop the plan, and a video (*An Introduction to the ICR Water Utility Database System*, EPA 814-V-96-004) is available to introduce utility personnel to the software. Training courses will also be offered by AWWA in September and October of 1996 to provide "hands-on" instruction in the use of the software. Additional help on the use of the software will also be available from the

AWWA A-Team and through the ICR Data Management System Hotline (see Section 4). The initial sample plan must be submitted to EPA on diskette using the data entry software.

The PWS must begin monitoring the month after EPA notifies the PWS that the plan has been approved. In general, PWSs must conform with ICR requirements for the following dates (see also **Exhibit 2-10**):

■ ***DBP and Related Monitoring***

- Start: Month following approval of sampling plan
- Continue: 18 consecutive months

■ ***Microbiological Monitoring***

- Start: Month following approval of sampling plan
- Continue: 18 consecutive months

■ ***Treatment Study Applicability Monitoring***

- Start: Prior to September 30, 1996 (see July 24, 1996 William Diamond Letter)
- Continue: 12 consecutive months for TOC and UFCTOX
4 consecutive quarters for THM4 and HAA5

■ ***Treatment Studies***

- Start: Prior to April 14, 1998
- End: July 14, 1999.

Exhibit 2-1: Categorization Worksheet

Treatment Plant Name

Reference Number

Instructions Use a separate worksheet for each treatment plant. This worksheet is to be used to calculate the treatment plant population information necessary for determining a treatment plant's ICR category. Assign each treatment plant a reference number and insert this number where there are underscores below. Add the population information from Step 3 to the accompanying PWS Summary Sheet. Use the PWS Summary Sheet in conjunction with Exhibit 2-4 to determine each treatment plant's ICR categories.

1. Gather the following information from operational records:

This TP	Each TP	PWS
$F_{S_} =$ <input type="text"/>	$F_{C\#} = F_{S\#} + F_{G\#} + F_{P\#}$	$P_R =$ <input type="text"/>
$F_{G_} =$ <input type="text"/>	$F_{C_} =$ <input type="text"/>	$F_N =$ <input type="text"/>
$F_{P_} =$ <input type="text"/>	If others, list below	$F_W =$ <input type="text"/>
	$F_{CT} = \Sigma F_{C\#}$	<input type="text"/>

2. Calculate the PWS-specific conversion factor, K:

$$K = \frac{F_{CT} + F_N - F_W}{P_R}$$

=

=

Note: If $P_R = 0$, see reverse side

3. Convert flow data to population, using $P = \frac{F}{K}$:

$$P_{S_} = \frac{F_{S_}}{K} =$$

$$P_{G_} = \frac{F_{G_}}{K} =$$

$$P_{P_} = \frac{F_{P_}}{K} =$$

$$P_{C_} = P_{S_} + P_{G_} + P_{P_} =$$

Key:

General

F = flow value (millions of gallons per day)
P = population value (# of people)
TP = treatment plant
PWS = public water system

Variables with 1 subscript

P_R = retail population
 F_N = purchased finished water not treated
 F_W = wholesale flow

Variables with 2 subscripts

1st indicates source type
S = surface water P = purchased
G = ground water C = combined
2nd indicates either TP number (#) or Total (T)

Exhibit 2-1: Categorization Workshop (continued)

If a PWS sells all its finished water, the population served is calculated as follows:

$$\text{PWS population served} = 7,700 (\text{PWSs average treated flow in MGD})^{0.95}$$

$$=$$
$$=$$

$$\text{TP population served} = \frac{\text{PWS population served} \times \text{TP flow}}{\text{PWS average treated flow}}$$

$$=$$
$$=$$

Exhibit 2-1a: Example Categorization Worksheet for City A (Treatment Plant Number 1)

Name <u>1</u>
Treatment Plant Name <u>1</u>
Reference Number

Instructions Use a separate worksheet for each treatment plant. This worksheet is to be used to calculate the treatment plant population information necessary for determining a treatment plant's ICR category. Assign each treatment plant a reference number and insert this number where there are underscores below. Add the population information from Step 3 to the accompanying PWS Summary Sheet. Use the PWS Summary Sheet in conjunction with Exhibit 2-4 to determine each treatment plant's ICR categories.

1. Gather the following information from operational records:

This TP	Each TP	PWS
$F_{S-1} = \boxed{3}$	$F_{C\#} = F_{S\#} + F_{G\#} + F_{P\#}$	$P_R = \boxed{250,000}$
$F_{G-1} = \boxed{7}$	$F_{C-1} = \boxed{10}$	$F_N = \boxed{2}$
$F_{P-1} = \boxed{0}$	If others, list below	$F_W = \boxed{5}$
	$F_{C2} = 15$	$F_{CT} = \Sigma F_{C\#}$
		$\boxed{25}$

2. Calculate the PWS-specific conversion factor, K:

$$K = \frac{F_{CT} + F_N - F_W}{P_R}$$

$$= \frac{25 + 2 - 5}{250,000}$$

$$= \boxed{8.8 \times 10^{-5}}$$

Note: If $P_R = 0$, see reverse side

3. Convert flow data to population, using $P = \frac{F}{K}$:

$$P_{S-1} = \frac{3}{8.8 \times 10^{-5}} = \boxed{34,091}$$

$$P_{G-1} = \frac{7}{8.8 \times 10^{-5}} = \boxed{79,545}$$

$$P_{P-1} = \frac{0}{8.8 \times 10^{-5}} = \boxed{0}$$

$$P_{C-1} = P_{S-1} + P_{G-1} + P_{P-1} = \boxed{113,636}$$

Key:

General

F = flow value (millions of gallons per day)
P = population value (# of people)
TP = treatment plant
PWS = public water system

Variables with 1 subscript

P_R = retail population
 F_N = purchased finished water not treated
 F_W = wholesale flow

Variables with 2 subscripts

1st indicates source type
S = surface water P = purchased
G = ground water C = combined
2nd indicates either TP number (#) or Total (T)

Exhibit 2-1b: Example Categorization Worksheet for City A (Treatment Plant Number 2)

Name <u>2</u>
Treatment Plant Name
<u>2</u>
Reference Number

Instructions Use a separate worksheet for each treatment plant. This worksheet is to be used to calculate the treatment plant population information necessary for determining a treatment plant's ICR category. Assign each treatment plant a reference number and insert this number where there are underscores below. Add the population information from Step 3 to the accompanying PWS Summary Sheet. Use the PWS Summary Sheet in conjunction with Exhibit 2-4 to determine each treatment plant's ICR categories.

1. Gather the following information from operational records:

This TP	Each TP	PWS
$F_{s-2} = \boxed{0}$	$F_{C\#} = F_{S\#} + F_{G\#} + F_{P\#}$	$P_R = \boxed{250,000}$
$F_{G-2} = \boxed{10}$	$F_{C-2} = \boxed{15}$	$F_N = \boxed{2}$
$F_{P-2} = \boxed{5}$	If others, list below $F_{C1} = 10$	$F_W = \boxed{5}$
	$F_{CT} = \Sigma F_{C\#}$	$\boxed{25}$

2. Calculate the PWS-specific conversion factor, K:

$$K = \frac{F_{CT} + F_N - F_W}{P_R}$$

$$= \frac{25 + 2 - 5}{250,000}$$

$$= \boxed{8.8 \times 10^{-5}}$$

* will be the same for all plants in a PWS

Note: If $P_R = 0$, see reverse side

3. Convert flow data to population, using $P = \frac{F}{K}$:

$$P_{s-2} = \frac{0}{8.8 \times 10^{-5}} = \boxed{0}$$

$$P_{G-2} = \frac{10}{8.8 \times 10^{-5}} = \boxed{113,636}$$

$$P_{P-2} = \frac{5}{8.8 \times 10^{-5}} = \boxed{56,818}$$

$$P_{C-2} = P_{s-2} + P_{G-2} + P_{P-2} = \boxed{170,454}$$

Key:

General

F = flow value (millions of gallons per day)
P = population value (# of people)
TP = treatment plant
PWS = public water system

Variables with 1 subscript

P_R = retail population
 F_N = purchased finished water not treated
 F_W = wholesale flow

Variables with 2 subscripts

1st indicates source type
S = surface water P = purchased
G = ground water C = combined

2nd indicates either TP number (#) or Total (T)

Exhibit 2-2a: Example PWS Summary Sheet for City A

A. PWS

P_{CT} = PWS combined population served

= $\sum P_{C\#}$ (from below)

= 284,090

Key

$P_{C\#}$ = Treatment plant total population served
 $P_{S\#}$ = Treatment plant surface water population served
 $P_{G\#}$ = Treatment plant ground water population served
 $P_{P\#}$ = Treatment plant purchased finished water population served
PWS = Public water system

B. Treatment Plants

Treatment Plant Name	Reference #	$P_{C\#}$	$P_{S\#}$	$P_{G\#}$	$P_{P\#}$	Treatment Plant Category
Name 1	1	113,636	34,091	79,545	0	A
Name 2	2	170,454	0	113,636	56,818	B

Exhibit 2-3: ICR Treatment Plant Categorization

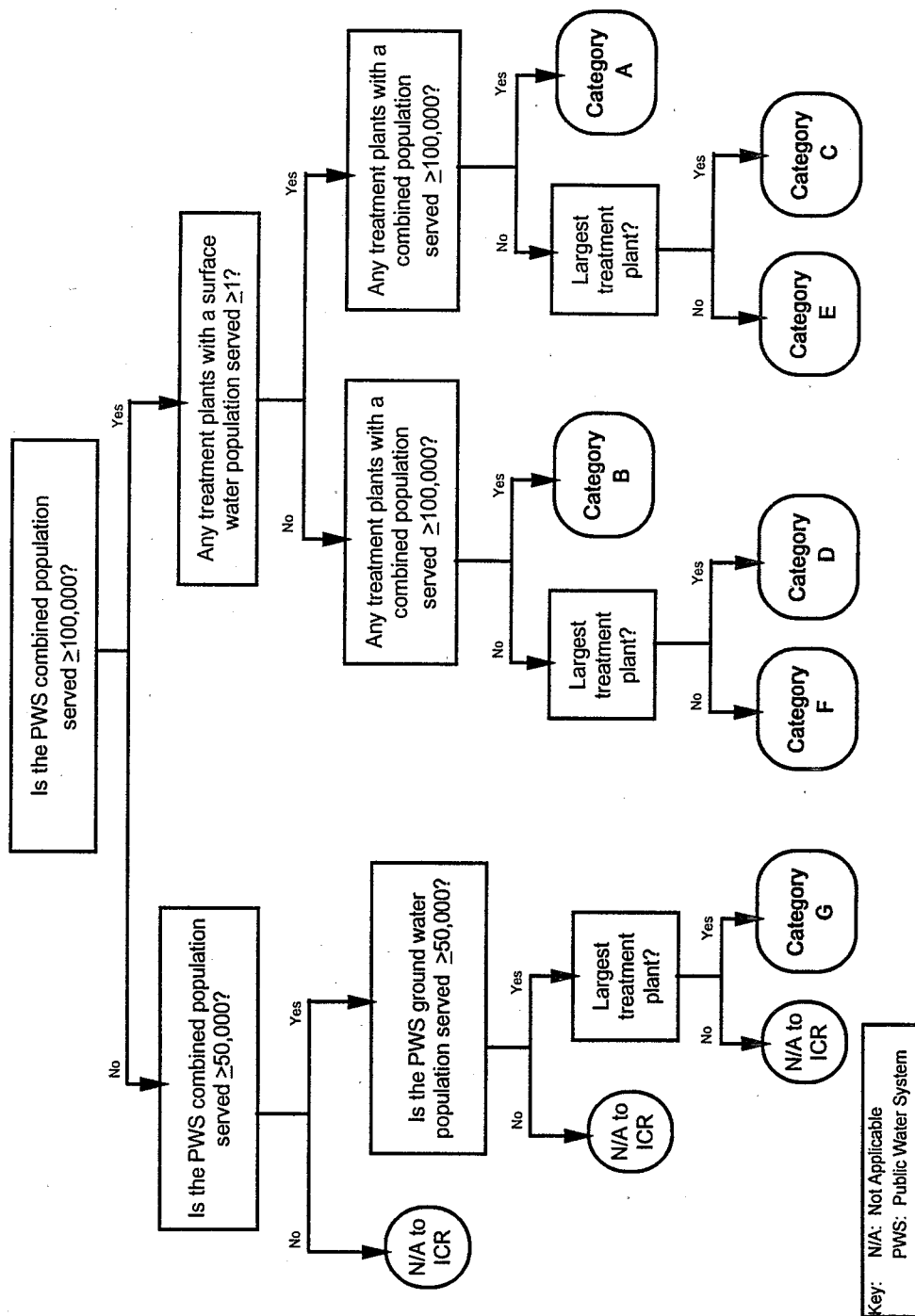


Exhibit 2-4: Treatment Plant Categories
(Adapted from ICR §141.141 Table 1)

Treatment Plant Category	PWS Criteria	Treatment Plant Criteria		
	Combined Population Served, P _{CT}	Combined Population Served, P _{C#}	Surface Water Population Served, P _{S#}	Ground Water Population Served, P _{G#}
A	≥100,000	≥100,000	≥1	N/A
B	≥100,000	≥100,000	0	N/A
C	≥100,000	<100,000 and largest in PWS	≥1	N/A
D	≥100,000	<100,000 and largest in PWS	0	<100,000
E	≥100,000	<100,000 and not largest in PWS	≥1	N/A
F	≥100,000	<100,000 and not largest in PWS	0	<100,000
G	50,000-99,999 (≥50,000 served by ground water)	N/A	N/A	largest treatment plant

Key: N/A = not applicable
PWS = public water system

Exhibit 2-5: ICR DBP Applicability Criteria and Monitoring Requirements
(Adapted from ICR §141.141 Table 2)

Treatment Plant Category ¹	DBP Monitoring Requirements
A	§141.142 Tables 1-6 ²
B	§141.142 Tables 1-6 ²
C	§141.142 Tables 1-6 ²
D	§141.142 Tables 1-6 ²
E	§141.142 Tables 1-6 ²
F	§141.142 Tables 1-6 ²
G	N/A

1. As determined by Appendix A §141.141(a).
2. Table 2 is required only for treatment plants using chloramines. Table 3 is required only for treatment plants using hypochlorite solution. Tables 4a and 4b are required only for treatment plants using ozone. Tables 5a and 5b are required only for treatment plants using chlorine dioxide.

Key: N/A = not applicable

**Exhibit 2-6: ICR Microbiological Applicability Criteria
and Monitoring Requirements**
(Adapted from ICR §141.141 Tables 2 and 3)

Treatment Plant Category	Microbiological Monitoring Requirements
A	Treatment plant influent and finished water ¹ for: <ul style="list-style-type: none"> • total culturable viruses² • total coliforms • fecal coliforms or <i>E. coli</i> • <i>Giardia</i>³ and <i>Cryptosporidium</i>³
B	N/A
C	Treatment plant influent and finished water ¹ for: <ul style="list-style-type: none"> • total culturable viruses² • total coliforms • fecal coliforms or <i>E. coli</i> • <i>Giardia</i>³ and <i>Cryptosporidium</i>³
D	N/A
E	Treatment plant influent and finished water ¹ for: <ul style="list-style-type: none"> • total culturable viruses² • total coliforms • fecal coliforms or <i>E. coli</i> • <i>Giardia</i>³ and <i>Cryptosporidium</i>³
F	N/A
G	N/A

1. Only required for PWSs that during the first 12 months of monitoring detect ≥ 10 *Giardia* cysts, ≥ 10 *Cryptosporidium* oocysts, or ≥ 1 total culturable virus in 1 L of water; or calculates the numerical value of the *Giardia* or *Cryptosporidium* concentration to be $\geq 1,000/100$ L or the virus concentration is $\geq 100/100$ L; or no pathogens are detected in the sample, but the numerical value of the detection limit for *Giardia* or *Cryptosporidium* is calculated to be $\geq 1,000/100$ L or for viruses is $\geq 100/100$ L. See §141.143 for details.
2. PWS may avoid virus monitoring if the PWS has monitored total coliforms, fecal coliforms, or *E. coli* in treatment plant influent for at least 5 days a week for any 6-month period beginning after January 1, 1994; and 90 percent of all samples taken in that period contained ≤ 100 total coliforms/100 mL, 20 fecal coliforms/100 mL, or 20 *E. coli*/100 mL.
3. A PWS may avoid finished water monitoring requirements for *Giardia* and *Cryptosporidium* if the PWS notifies EPA that it will comply with the alternative requirements described in §141.143(a)(2)(iii). The PWS must still conduct finished water quality monitoring for all other microorganisms except that *Giardia* and *Cryptosporidium* monitoring in the finished water is not required.

N/A = not applicable

**Exhibit 2-7: ICR Treatment Study Applicability Monitoring
and Treatment Study Requirements
(Adapted from ICR §141.141 Table 2)**

Treatment Plant Category	Requirements		Treatment Plant Exemption Criteria
	Treatment Study Applicability Monitoring	Treatment Study	
A	TOC, THM4, HAA5, and UFCTOX ¹	Bench- or Pilot-scale (if P _{C#} ≥ 500,000, pilot-scale required)	<ul style="list-style-type: none"> Uses chlorine as both the primary and residual disinfectant with levels <40µg/L for THM4 and ≤30µg/L for HAA5 <p align="center">-OR-</p>
B	TOC, THM4, HAA5, and UFCTOX ¹	Bench- or Pilot-scale (if P _{C#} ≥ 500,000, pilot-scale required)	
C	TOC, THM4, HAA5, and UFCTOX ¹	Bench- or Pilot-scale	<ul style="list-style-type: none"> Uses surface water with a treatment plant influent TOC level ≤4.0 mg/L <p align="center">-OR-</p>
D	TOC, THM4, HAA5, and UFCTOX ¹	Bench- or Pilot-scale	
E	N/A	N/A	<ul style="list-style-type: none"> Uses ground water with finished water TOC level ≤2.0 mg/L <p align="center">-OR-</p>
F	N/A	N/A	
G	TOC, THM4, HAA5, and UFCTOX ¹	Bench- or Pilot-scale	<ul style="list-style-type: none"> Already using full -scale GAC or membrane technology capable of achieving precursor removal

1. THM4 and HAA5 monitoring only required for PWSs intending to avoid treatment studies according to §141.144(e)(3)(i); UFCTOX monitoring only required for some PWSs intending to qualify for a common source designation.

Key: N/A = not applicable
HAA5 = mono-, di-, and trichloroacetic acid and mono- and dibromoacetic acid
TOC = total organic carbon
THM4 = chloroform, bromodichloromethane, dibromochloromethane, and bromoform
UFCTOX = total organic halides formed under the uniform formation conditions
P_{C#} = treatment plant total population served

**Exhibit 2-8: Joint Studies Requirements for Treatment Plants
with a Population Served <500,000**
(Adapted from table in ICR §141.141(e)(4)(ii))

Number of Plants	Minimum Number of Studies to be Conducted		
	Pilot	Bench	Total
Two	1 ¹		1
Three	1 ¹	1 ¹	2
Four	2 ²		2
Five	2 ²	1 ¹	3
Six	2 ²	2 ²	4

1. GAC or membrane
2. GAC and/or membrane

**Exhibit 2-9: Joint Studies Requirements for Treatment Plants
with a Population Served ≥500,000**
(Adapted from table in ICR §141.141(e)(4)(ii))

Number of Plants	Minimum Number of Studies to be Conducted		
	Pilot	Bench	Total
Two	1 ¹	2 ²	3
Three	2 ²		2

1. GAC or membrane
2. GAC and/or membrane

Exhibit 2-10: ICR Monitoring Schedule

Monitoring Type	Begin Monitoring	Time Period	Rule Location Reference
DBP and Related	Month following approval of sampling plan	18 consecutive months	§141.141(f)(3)
Microbiological	Month following approval of sampling plan	18 consecutive months	§141.141(f)(4)
Treatment Study Applicability	Prior to September 30, 1996 ¹	12 consecutive months for TOC and UFCTOX	§141.141(f)(5)(i)
		4 consecutive quarters for THM4 and HAA5	
Treatment Studies	Prior to April 14, 1998	Results to be delivered to EPA by July 14, 1999	§141.141(f)(5)(ii)

1. Modified in July 24, 1996 letter from William Diamond, USEPA.

Key: DBP = disinfection byproduct
 FR = *Federal Register*
 HAA5 = mono-, di-, and trichloroacetic acid and mono- and dibromoacetic acid
 THM4 = chloroform, bromodichloromethane, dibromochloromethane, and bromoform
 UFCTOX = total organic halides formed under the uniform formation conditions



Outline: ICR §141.142—DBP and Related Monitoring

ICR FR Page and Column (Reference Manual Page)

- (a) **Monitoring Requirements** 24374, col. 3 (2-43)
 - (1) Treatment Plant Requirements for PWSs specified in §141.141(b) 24375, col. 1 (2-44)
 - (i) Finished water sampling points
 - (ii) Treatment plant influent sampling points
 - Monthly Monitoring Requirements for Treatment Plants
 - Quarterly Monitoring Requirements for Treatment Plants
 - (2) Additional Requirements for PWSs Using Chloramines 24376, col. 1 (2-45)
 - Additional Quarterly Monitoring for Treatment Plants Using Chloramines
 - (3) Additional Requirements for PWSs Using Hypochlorite Solutions 24376, col. 1 (2-45)
 - Additional Quarterly Monitoring for Treatment Plants Using Hypochlorite Solutions
 - (4) Additional Requirements for PWSs Using Ozone 24376, col. 1 (2-45)
 - Additional Monthly Monitoring for Treatment Plants Using Ozone
 - Additional Quarterly Monitoring for Treatment Plants Using Ozone
 - (5) Additional Requirements for PWSs Using Chlorine Dioxide 24377, col. 1 (2-46)
 - Additional Monthly Monitoring for Treatment Plants Using Chlorine Dioxide
 - Additional Quarterly Monitoring for Treatment Plants Using Chlorine Dioxide
 - (6) Additional Requirements 24377, col. 1 (2-47)
 - Public Water System Information
 - Plant Influent Information
 - Unit Process Information
 - Additional Process Train Information
 - Finished Water Distribution Information
 - (i) Flow at time of sampling (MGD)
 - (ii) T_{10} (min)
 - (iii) Chemicals in use at time of sampling
 - (iv) Short circuiting factor (optional)
 - (v) T_{50} (min) (optional)
- (b) **Analytical Methods** 24383, col. 1 (2-48)
 - (1) Analytical Methods Approved for Monitoring Rule
 - (2) ICR Laboratory Approval

- (c) **Reporting** 24384, col. 1 (2-48)
 - (1) Reporting Requirements
 - (2) Additional Requirements (Sampling Plans)
 - (3) Address for Report Submission
 - (4) Retention of Data

- (d) **Incorporation By Reference** 24384, col. 2 (2-50)
 - (1) "Standard Methods for the Examination of Water and Wastewater"
 - (2) "Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems using Surface Water Sources"

Section Summary: ICR §141.142—DBP and Related Monitoring

In general, PWSs that serve $\geq 100,000$ people are required to conduct monitoring for DBPs and other treatment parameters. PWSs affected by this requirement must conduct monthly monitoring for DBPs, DBP precursors, and other chemical parameters at each treatment plant and in the distribution system for 18 months, concurrently with microbial monitoring. These PWSs will also be required to characterize treatment processes in the treatment plant on a monthly basis for the same period. **Exhibit 2-5** presents the monthly monitoring requirements for DBPs, DBP precursors, and other chemical parameters by treatment plant category.

PWSs that receive all of their water from a supplier and do not further disinfect that water before distribution are not required to conduct any monitoring under this rule. PWSs that use disinfectants other than free chlorine (chloramines, hypochlorite solution, ozone, or chlorine dioxide) are required to conduct additional analyses for parameters associated with those disinfectants.

The DBP and Related Monitoring section (§141.142) of the ICR describes the monitoring requirements, analytical methods, and reporting responsibilities for systems conducting DBP and related monitoring. Applicability for DBP and related monitoring is presented in Section Summary: ICR §141.141—General Requirements, Applicability, and Schedule for Information Collection (see Section 2). The flowchart in **Exhibit 2-11** has been provided to aid in determining each utility's DBP and related monitoring requirements.

(a) MONITORING REQUIREMENTS

All samples must be collected according to the procedures in the EPA's *ICR Sampling Manual* (EPA 814-B-96-001, April 1996). The manual does not cover specific sampling procedures for the chemical parameters because these procedures have been used by the water systems for some time and they should be familiar to them.

In some instances, a PWS may be required to sample twice at the same location and time because of overlapping monitoring requirements. If a PWS has a plant configuration that results in two required sampling points at the same location and time, these sampling points should be considered a single sampling location and duplicate analyses are not required.

PWSs that receive **all** of their water from a supplier (wholesaler) and do not perform further disinfection of that water before the distribution system are **not** required to conduct any monitoring under this rule. A PWS that uses purchased finished water must determine whether any monitoring of treatment plant influent is required due to prior treatment of the water (e.g., chlorine, chloramines, hypochlorite, or chlorine dioxide).

(1) MONTHLY AND QUARTERLY MONITORING REQUIREMENTS FOR TREATMENT PLANTS

Exhibits 2-12 and 2-13 present monthly and quarterly monitoring requirements for treatment plants; the requirements apply to treatment plants required to sample under §141.141(b). The exhibits present frequency of testing (i.e., monthly and quarterly), sampling points for monitoring, and required parameters. A complete set of samples (depicted in **Exhibits 2-12 and 2-13**) is required for each affected plant. Samples will be collected according to a sampling plan approved by EPA. Special considerations for finished water samples include the following:

- A sample of finished water represents the final product water from a particular treatment plant. The sample of finished water must be collected at a point after all treatment processes for the treatment plant are complete (including the clearwell and final points of chlorination) **and** before the distribution system.
- A PWS must collect a sample of purchased finished water **only** if the PWS re-disinfects the purchased finished water. A PWS that purchases finished water from another PWS must collect a sample before any additional disinfectant is added to the purchased finished water.

An intake (influent) sample should be collected after the intake but before blending with waters from other intakes and before addition of chemicals or any treatment. There are several special considerations for intake water samples:

- For systems with single intakes, samples are to be taken after the intake, before addition of chemicals or any treatment.
- For systems with multiple intakes without treatment or chemicals added, samples are to be taken after the intakes prior to where the waters are blended.
- For treatment plants that have multiple intakes and add chemicals at the intakes, the sample of treatment plant influent must be a flow proportional composite of intake samples collected after the intakes before chemical addition and before pretreatment. However, if the intakes are expected to have the same source-water quality, one representative intake sample may be taken.
- If a disinfectant is added at or before the intake (e.g., for zebra mussel control), the sample must be taken in the vicinity of the intake so that the sample is not contaminated by the disinfectant.
- A sample of treatment plant influent for a PWS that treats purchased finished water is taken at a location just before the purchased finished water is treated by the receiving utility.

The *ICR Sampling Manual* (EPA 814-B-96-001, April 1996), illustrates some of the special situations.

(2) **ADDITIONAL QUARTERLY MONITORING REQUIREMENTS FOR TREATMENT PLANTS USING CHLORAMINES**

PWSs are required to conduct additional quarterly monitoring for treatment plants that use chloramines for treatment or for maintenance of a disinfection residual. **Exhibit 2-14** presents the additional quarterly monitoring requirements for treatment plants using chloramines. Specifically, these plants must monitor for cyanogen chloride at three sampling points: (1) treatment plant influent for **purchased** finished water, (2) finished water (plant effluent), and (3) distribution system sample point representing the maximum residence time in the distribution system relative to the treatment plant. [(a)(2)]

PWSs must submit their cyanogen chloride samples to EPA (Cincinnati) for analysis according to the procedures in the EPA's *ICR Sampling Manual* (EPA 814-B-96-001, April 1996). Before collecting cyanogen chloride samples, PWSs must contact EPA to schedule analyses of these samples. **EPA will not analyze any samples that have not been scheduled.** For sample scheduling, the address for EPA is:

ICR Sample Coordinator
EPA – Technical Support Center
ATTN: Room 188
26 W. Martin Luther King Drive
Cincinnati, OH 45268
Fax #: (513) 569-7191.

(3) **ADDITIONAL QUARTERLY MONITORING REQUIREMENTS FOR TREATMENT PLANTS USING HYPOCHLORITE SOLUTIONS**

PWSs are required to conduct additional quarterly monitoring for treatment plants that use hypochlorite solutions for treatment or for maintenance of a disinfection residual. **Exhibit 2-15** presents the additional quarterly monitoring requirements for treatment plants using hypochlorite solutions. Specifically, these plants must monitor for chlorate at these three sampling points: (1) treatment plant influent, (2) treatment plant influent for purchased finished water, and (3) finished water (plant effluent). [(a)(3)]

In addition, these PWSs will have to analyze the hypochlorite stock solution for four water quality parameters (i.e., pH, temperature, free residual chlorine, and chlorate). The hypochlorite stock solution to be sampled is the one that is used at the treatment plant to feed chlorine into the process stream at the time of sampling (i.e., not solutions used at booster stations in the distribution system). If more than one hypochlorite stock solution is used in a treatment plant, then a composite sample of all stock solutions must be collected.

(4) **ADDITIONAL MONTHLY AND QUARTERLY MONITORING REQUIREMENTS FOR TREATMENT PLANTS USING OZONE**

PWSs are required to conduct additional monthly and quarterly monitoring for treatment plants that use ozone for treatment. **Exhibit 2-16** presents the additional **monthly** monitoring requirements for treatment plants using ozone. Specifically, these plants must

monitor for bromide, bromate, ammonia, and ozone residual. **Exhibit 2-17** presents the additional **quarterly** monitoring requirements for treatment plants using ozone and includes aldehydes, assimilable organic carbon (AOC), and biodegradable organic carbon (BDOC). AOC and BDOC are optional analyses (some PWSs collect these data for other purposes and may want to submit these data for analysis with the ICR data). [(a)(4)]

PWSs must collect most of their bromate samples in duplicate—the PWS will analyze one aliquot and EPA the other (using a low-level bromate method). PWSs are to send bromate and aldehydes samples to EPA for analysis according to the procedures in EPA's *ICR Sampling Manual* (EPA 814-B-96-001, April 1996). Before collecting bromate and aldehydes samples, the PWS must contact EPA to schedule analyses of these samples. **EPA will not analyze any samples that have not been scheduled.** For sample scheduling, the address for EPA is:

ICR Sample Coordinator
EPA – Technical Support Center
ATTN: Room 188
26 W. Martin Luther King Drive
Cincinnati, OH 45268
Fax #: (513) 569-7191.

**(5) ADDITIONAL MONTHLY AND QUARTERLY MONITORING REQUIREMENTS FOR
TREATMENT PLANTS USING CHLORINE DIOXIDE**

PWSs are required to conduct additional quarterly monitoring for treatment plants that use chlorine dioxide for treatment or for maintenance of a disinfection residual. **Exhibit 2-18** presents the additional monthly monitoring requirements for treatment plants using chlorine dioxide; they must monitor for chlorine dioxide residual, chlorite, chlorate, pH, bromate, and temperature at various sampling locations. **Exhibit 2-19** presents the additional quarterly monitoring requirements for treatment plants using chlorine dioxide, including chlorate and aldehydes and, as optional analyses, AOC and BDOC (some PWSs may want to submit these optional data to provide an additional perspective in the analysis of the ICR data).

As described above, PWSs must collect most of their bromate samples in duplicate—one aliquot for the PWS to analyze and the other aliquot for submission to EPA for “low level” bromate analysis. PWSs must send bromate and aldehydes samples to EPA for analysis according to the procedures in the EPA's *ICR Sampling Manual* (EPA 814-B-96-001, April 1996). Before the collection of bromate and aldehydes samples, the PWS must contact EPA to schedule analysis of these samples. **EPA will not analyze any samples that have not been scheduled.** For sample scheduling, the address for EPA is:

ICR Sample Coordinator
EPA – Technical Support Center
ATTN: Room 188
26 W. Martin Luther King Drive
Cincinnati, OH 45268
Fax #: (513) 569-7191.

(6) ADDITIONAL REQUIREMENTS

PWSs are also required to report the applicable information in **Exhibits 2-20 to 2-24** (which correspond to ICR §141.142 Tables 6a-6e). Each exhibit contains requirements for permanent, monthly, and/or design data. A list of the five exhibits follows:

- **Exhibit 2-20: Public Water System Information.** Includes information on the PWSs, treatment plants, and process trains (corresponds to ICR §141.142 Table 6a).
- **Exhibit 2-21: Plant Influent Information.** Includes information on water resources, intakes, and plant influent (corresponds to ICR §141.142 Table 6b).
- **Exhibit 2-22: Unit Process Information.** Includes information on various unit process characteristics (corresponds to ICR §141.142 Table 6c).

In addition to the information in **Exhibit 2-22**, PWSs are required to report the following for each unit process:

- **Flow at Time of Sampling (MGD).** [(a)(6)(i)]
- **T₁₀ (minutes).** PWSs will determine T₁₀ (i.e., time of 10% of tracer to have appeared in effluent) from tracer studies in the clearwell of all treatment plants required to monitor for 18 months under §141.141(c)(2). For unit processes other than a clearwell, PWSs will estimate T₁₀ or use an interpolation of tracer study T₁₀ using multiple flows for each unit process in which a disinfectant residual exists. [(a)(6)(ii)]
- **Chemicals in Use at the Time of Sampling.** PWSs will report the chemical dose at the time of sampling and the chemical formula (i.e., name, chemical dose, and measurement formula). PWSs will provide the chemical formula to determine the correct amount of the chemical compound being added. [(a)(6)(iii)]

PWSs may report the following information for each unit process:

- **Short Circuiting Factor.** The short circuiting factor is an assumed value for the ratio of T₁₀ to nominal contact time (i.e., tank volume divided by flow). [(a)(6)(iv)]
- **T₅₀ (minutes).** T₅₀ (i.e., time of 50% of tracer to have appeared in effluent) should be reported only if based on a tracer study. [(a)(6)(v)]

T₁₀ and T₅₀ tracer studies must be conducted as specified in the *Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources* (available from AWWA).

- **Exhibit 2-23: Additional Unit Process Train Information.** Includes additional information on various unit process characteristics (corresponds to ICR §141.142 Table 6d).
- **Exhibit 2-24: Finished Water Distribution Information.** Includes information on the entry point, wholesale data, and the distribution system (corresponds to ICR §141.142 Table 6e).

(b) ANALYTICAL METHODS

The quality of the data generated during the monitoring period was one of the major issues discussed during development of the ICR. The data must meet specific accuracy and precision targets to achieve the objectives of the ICR. Because many laboratories will generate the data, strict data quality controls are essential. Maintaining data comparability between laboratories is necessary to use the data successfully in sophisticated correlational analyses to predict DBP formation as a function of water quality conditions. Therefore, strict controls on the collection and analysis of the data must be defined to ensure usable data. EPA will assist the drinking water industry in identifying qualified ICR "approved" laboratories that can perform the analyses required under the ICR accurately and reliably.

PWS and contract laboratories are required to use the analytical methods identified in **Exhibit 2-25** (corresponds to ICR §141.142, Table 7) when conducting analyses under this section of the ICR. This exhibit presents, by analyte, the required methodology—40 *Code of Federal Regulations* (CFR) Reference, EPA Method, or Standard Method. [(b)(1)]

Analyses must be conducted by laboratories with EPA approval to perform sample analysis for compliance with this rule. See Section 7 of this reference manual for a description of the ICR laboratory approval process.

(c) REPORTING

(1) FORMAT

The utility will enter monthly sampling results into the ICR Water Utility Database System as they are received from the laboratories and reviewed by utility personnel. The data will be submitted to EPA when **all** the monthly sampling results for a particular sampling period have been received, reviewed, and entered into the database system (which could take several months, especially for virus results). The utility will submit the data to EPA (electronically) in a monthly report of the analytical results of all samples collected for the sampling period (including quarterly samples collected in that month) and all relevant plant operational data. These data will be submitted to EPA on diskette no later than the fourth month following the month in which the samples were collected.

The report will include the information from **Exhibits 2-20** through **2-24**, as well as the following information: [(c)(1)]

- Public Water Supply Identification Number (PWSID)
- ICR plant identification number
- Sample date
- Analysis date
- Laboratory identification numbers
- Analytical methods used
- Sample identification numbers
- Quality assurance code
- Internal standards
- Surrogate standards
- Preserved sample pH, if appropriate.

For detailed information, please refer to the EPA guidance document on the data entry of systems information, *ICR Water Utility Database System Users' Guide* (EPA 814-B-96-004, April 1996).

(2) ADDITIONAL REQUIREMENTS (SAMPLING PLANS)

PWSs must submit for EPA approval a sampling plan for each treatment plant qualifying for DBP and related monitoring requirements as specified in §141.141(b)(2). PWSs required to comply with ICR requirements must submit initial sampling plans to EPA for review and approval no later than 8 weeks after receiving the final applicability letter from EPA. The utility must develop an initial sampling plan for each treatment plant affected by the ICR that includes the plant design parameters for each unit process in each process train for each treatment plant, the location of each sampling point, and the analytical parameters to be monitored at each sampling point.

EPA's *ICR Water Utility Database System and Users' Guide* contains data entry worksheets that will aid in the collection and entry of the plant design parameters. The data entry software will be used to develop the plan. A video will be provided by EPA to introduce utility personnel to the software. Training courses will be offered by AWWA in September and October 1996 to provide "hands-on" instruction in the use of the software. Additional help on the use of the software will be available from the AWWA A-Team and through the ICR Data Management System Hotline (see Section 4 of this reference manual).

The sampling plan must be submitted to EPA on diskette using the data entry software. Once EPA notifies the PWS that the plan has been approved, the PWS must begin monitoring the following month.

Specifically, the plan must indicate:

- Sampling point locations
- Monitoring to be conducted at each point
- Process treatment train information.

Exhibit 2-26 presents an example of a typical treatment plant schematic and **Exhibit 2-27** presents an Initial Sampling Schematic (ISS). The AWWA A-Team will develop ISSs for

each treatment plant in all PWSs. ISSs will be mailed to utilities by the middle of August 1996. The ISSs will be used to develop initial sampling plans (ISPs) in the Water Utility Database System. The initial sampling plan, along with the ISS, is to be submitted to EPA no later than 8 weeks after the PWS receives a Notice of ICR Final Applicability Determination as required by §141.143(c)(3)(ii).

(3) REPORTING ADDRESS

All data reports required by this section are to be submitted to EPA at the following address:

USEPA (ICR4600)
ICR Data Center
Room 1111 East Tower
401 M Street, SW
Washington, DC 20460.

(4) RETENTION OF DATA

PWSs are required to keep all data for at least 3 years following data submission to EPA.

(d) INCORPORATION BY REFERENCE

The documents listed below are incorporated by reference as approved by the Director of the *Federal Register* in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. These manuals will be sent to affected PWSs; they also can be requested through the Safe Drinking Water Hotline or reviewed at the following location:

USEPA
Drinking Water Docket (4101)
401 M Street, SW
Washington, DC 20460.

- *Standard Methods for the Examination of Water and Wastewater*, 19th ed., 1995. [(d)(1)] Available from:

American Public Health Association
1015 15th Street, NW
Washington, DC 20005.

- *Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources*, Appendices C and O, 1991. [(d)(2)] Available from:

American Water Works Association
6666 W. Quincy Avenue
Denver, CO 80235.

Exhibit 2-11: DBP Requirements by Treatment Plant Category

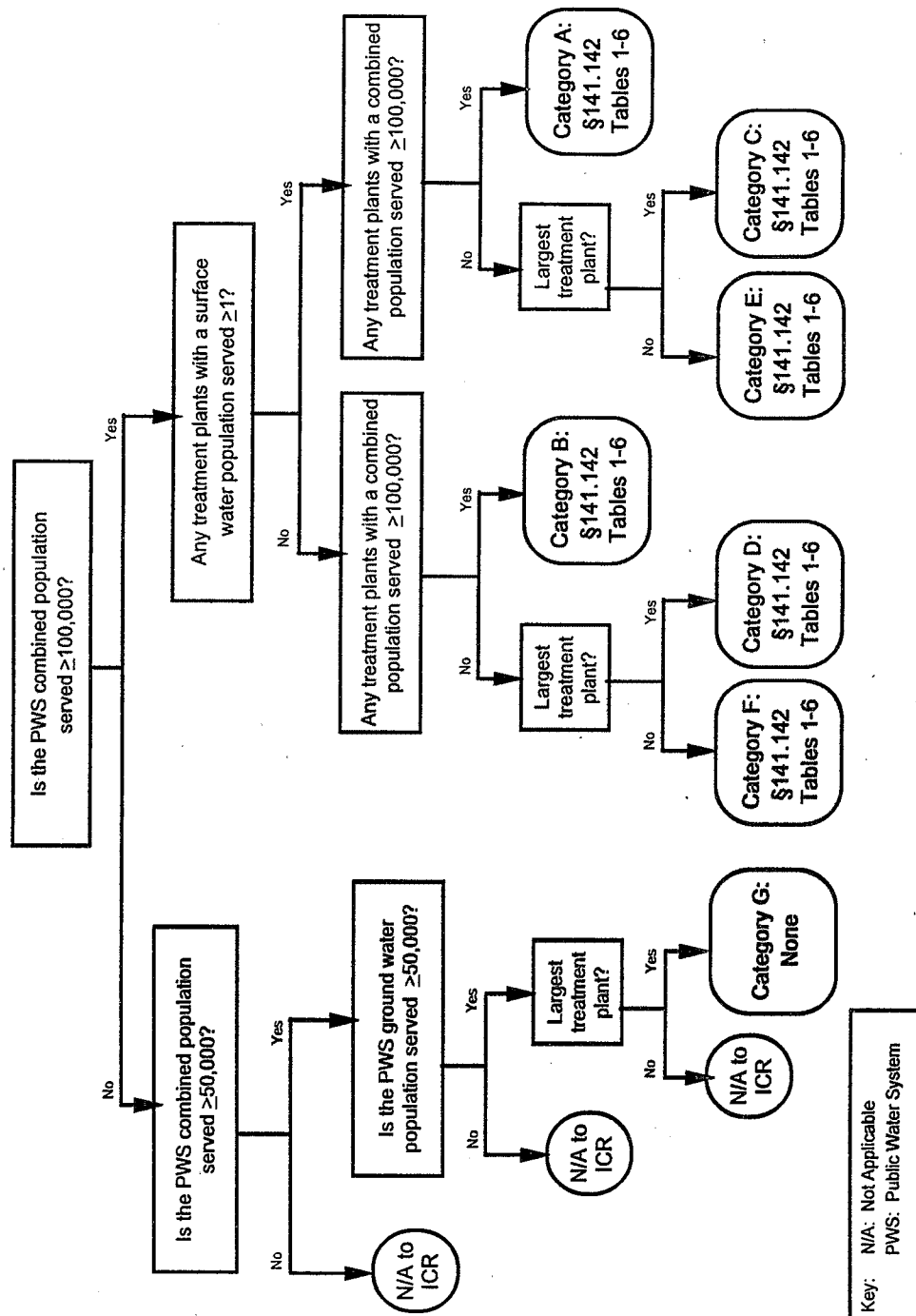


Exhibit 2-12. Monthly Monitoring Requirements for Treatment Plants
(Adapted from ICR §141.12 Table 1a)

Sampling Point	Water Quality Parameters					TOC ¹	UV ₂₅₄ ¹	Br ⁻	NH ₃	Dis. Residual ³	Chlorine Demand Test
	pH	Alkal.	Turb.	Temp.	Ca and Total Hardness						
Treatment plant influent for nonfinished water	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Treatment plant influent for purchased finished water ²	✓	✓	✓	✓	✓	✓	✓			✓	
Before first point of oxidation											✓
Washwater return between washwater treatment plant and point of addition to process train ⁴	✓	✓	✓	✓	✓	✓	✓			✓	
For water sources added after treatment plant influent, sample before blended with process train	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Before filtration	✓	✓	✓	✓	✓	✓	✓				
After filtration	✓	✓	✓	✓	✓	✓	✓				
Before each point of disinfection ⁵	✓	✓	✓	✓	✓	✓	✓				
After every unit process that is downstream from the addition of chlorine/chloramines										✓	
Finished water sample point (plant effluent)	✓	✓	✓	✓	✓	✓	✓			✓	
Entry point to distribution system ⁶	✓	✓	✓	✓	✓	✓	✓			✓	

1. TOC = total organic carbon; UV₂₅₄ = absorbance of ultraviolet light at 254 nanometers.

2. Samples of purchased finished water shall be taken before the addition of any more disinfectant.

3. Free chlorine residual and total chlorine residual shall be measured in treatment systems using free chlorine. Total chlorine residual, but not free chlorine residual, shall be measured in systems using chloramine as the residual disinfectant.

4. Washwater return shall be sampled before blending with the process train.

5. For utilities using ozone or chlorine dioxide, Tables 4 and 5, respectively, show additional monitoring requirements at this sampling point. Addition of ammonia for the purpose of converting free chlorine to chloramines is considered a point of disinfection addition. PWSs that disinfect just before filtration may use the "before filtration" sampling point analytical results to meet the monitoring requirement for this point.

6. Entry point to the distribution system only required for treatment plants that blend finished water with finished water from other plants prior to the entry point to the distribution system. For most treatment plants, the finished water sample point and the entry point to the distribution system are the same.

Exhibit 2-13: Quarterly Monitoring Requirements for Treatment Plants
(Adapted from ICR §141.142 Table 1b)

Sampling Point	TOX	THM4 ¹	HAA6 ^{1,7}	HAN ¹	CP ¹	HK ¹	CH ¹	Water Quality Parameters					Dis. Residual ⁵
								pH	Alkal.	Turb.	Temp.	Ca and Total Hardness	
Treatment plant influent for unfinished water	✓												
Treatment plant influent for purchased finished water	✓	✓	✓	✓	✓	✓	✓						
Washwater return between washwater treatment plant and point of addition to process train	✓												
After filtration if disinfectant is applied at any point in the treatment plant prior to filtration	✓	✓	✓	✓	✓	✓	✓						
Finished water sample point (plant effluent)	✓	✓	✓	✓	✓	✓	✓						
Entry point to distribution system ²	✓	✓	✓	✓	✓	✓	✓						
Simulated distribution system sample ³ (SDS)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Four monitoring points in distribution system ^{4,6}	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

1. TOX = total organic halide; THM4 = chloroform, bromodichloromethane, dibromochloromethane, and bromoform; HAA6 = mono-, di-, and trichloroacetic acid, and bromochloroacetic acid; HAN = dichloro-, trichloro-, bromochloro-, and dibromochloroacetic acid; CP = chloropicrin; HK = 1,1,1-trichloropropanone; CH = chloral hydrate. For THM4, HAA6, HAN, and HK, analytical results for individual analytes shall be reported.
2. Entry point to the distribution system only required for treatment plants that blend finished water with finished water from other plants before the entry point to the distribution system. For most treatment plants, the finished water sample point and the entry point to the distribution system are the same.
3. SDS sample is collected at the finished water sampling point (or entry point to the distribution system, see 2) and analyzed using the method specified in §141.142. PWSs that use only purchased finished water are not required to take an SDS sample.
4. For each treatment plant, one distribution system equivalent sample location (DSE) shall be chosen to correspond to the SDS sample, one sample location shall be chosen to be representative of maximum residence time for the treatment plant, and the remaining two sample locations shall be representative of the average residence time in the distribution system for the treatment plant. PWSs using purchased finished water shall take three samples representing the average residence time in the distribution system for the treatment plant and one sample representing the maximum residence time for the treatment plant (no DSE sample required).
5. Free chlorine residual and total chlorine residual shall be measured in treatment systems using free chlorine. Total chlorine residual, but not free chlorine residual, shall be measured in systems using chloramines as the residual disinfectant.
6. A PWS may use TTHM compliance monitoring locations and analytical results under §141.30 of this part to the extent that such locations and analytical results are consistent with the requirements of this section.
7. PWSs are encouraged to analyze for the additional HAAs: bromodichloro-, chlorodibromo-, and tribromo-acetic acid, and to report the results as part of the report required in (c)(1) of this section.

**Exhibit 2-14: Additional Quarterly Monitoring for Treatment Plants
Using Chloramines
(Adapted from ICR §141.142 Table 2)**

Sampling Point	Cyanogen Chloride ²
Treatment plant influent for purchased finished water ¹	✓
Finished water sample point (plant effluent)	✓
Distribution system sample point representing a maximum residence time in distribution system relative to the treatment plant	✓

1. Applicable only when wholesale water provider is using chloramines.

2. EPA shall provide all analytical results to the PWS. The PWS shall report all results in its monthly report.

**Exhibit 2-15: Additional Quarterly Monitoring for Treatment Plants
Using Hypochlorite Solutions
(Adapted from ICR §141.142 Table 3)**

Sampling Point	Chlorate	pH	Temp.	Free Residual Chlorine
Treatment plant influent for nonfinished water	✓			
Treatment plant influent for purchased finished water (only if wholesaler uses hypochlorite solutions)	✓			
Hypochlorite stock solution	✓	✓	✓	✓
Finished water sample point (plant effluent)	✓			

**Exhibit 2-16: Additional Monthly Monitoring Required of Treatment Plants
Using Ozone**

(Adapted from ICR §141.142 Table 4a)

Sampling Point	Bromide	Bromate ²	Ammonia	Ozone Residual
Ozone contactor influent	✓	✓ ³	✓	
Each ozone contact chamber effluent ¹				✓
Ozone contactor effluent		✓		
Finished water sample point (plant effluent)		✓		

1. Each ozone contactor can be subdivided into its contact chambers. Measure ozone residual until <0.05 mg/L is measured in two consecutive chambers.
2. EPA shall provide all analytical results to the PWS. The PWS shall report all results in its monthly report.
3. PWSs are not required to analyze a bromate sample at this location. However, PWSs are still required to submit a sample to EPA for analysis.

**Exhibit 2-17: Additional Quarterly Monitoring for Treatment Plants
Using Ozone**

(Adapted from ICR §141.142 Table 4b)

Sampling Point	Aldehydes ¹	AOC/BDOC ² (optional)
Ozone contactor influent	✓	✓
Ozone contactor effluent	✓	✓
Finished water sample point (plant effluent)	✓	✓

1. EPA shall measure the following aldehydes: formaldehyde, acetaldehyde, propanal, butanal, pentanal, glyoxal, and methyl glyoxal. EPA may analyze for other aldehydes. EPA shall provide all analytical results to the PWS. The PWS shall report all results in its monthly report.
2. Analysis and submission of data for both assimilable organic carbon (AOC) and biodegradable organic carbon (BDOC) are optional. Analytical methods for AOC and BDOC are listed in the *DBP/ICR Analytical Methods Manual*, EPA 814-B-94-002, which is available from the National Clearinghouse for Environmental Publications and Information, 11029 Kenwood Road, Cincinnati, OH 45242.

**Exhibit 2-18: Additional Monthly Monitoring for Treatment Plants
Using Chlorine Dioxide
(Adapted from ICR §141.142 Table 5a)**

Sampling Point	Chlorine Dioxide Residual	Chlorite	Chlorate	pH	Bromate ²	Temp.
Treatment plant influent for purchased finished water ¹	✓	✓	✓			
Before first chlorine dioxide application			✓		✓ ³	
Before application of ferrous salts, sulfur reducing agents, or GAC	✓	✓	✓	✓		
Finished water sample point (plant effluent)	✓	✓	✓		✓	
Three distribution system sampling points ⁴	✓	✓	✓	✓		✓

1. Applicable only when wholesaler water provider is using chlorine dioxide.
2. EPA shall provide all analytical results to the PWS. The PWS shall report all results in its monthly report.
3. PWSs are not required to analyze a bromate sample at this location. However, PWSs are still required to submit a sample to EPA for analysis.
4. One near first customer, one in middle of distribution system, and one representative of maximum residence time in the distribution system.

**Exhibit 2-19: Additional Quarterly Monitoring for Treatment Plants
Using Chlorine Dioxide
(Adapted from ICR §141.142 Table 5b)**

Sampling Point	Aldehydes ¹	AOC/BDOC (optional) ²
Before first chlorine dioxide application	✓	✓
Before first point of downstream chlorine/chloramine application after chlorine dioxide addition	✓	✓
Finished water sample point (plant effluent)	✓	✓

1. EPA shall measure the following aldehydes: formaldehyde, acetaldehyde, propanal, butanal, pentanal, glyoxal, and methyl glyoxal. EPA may analyze for other aldehydes. EPA shall provide all analytical results to the PWS. The PWS shall report all results in its monthly report.
2. Analysis and submission of data for both assimilable organic carbon (AOC) and biodegradable organic carbon (BDOC) are optional. Analytical methods for AOC and BDOC are listed in the *DBP/ICR Analytical Methods Manual*, EPA 814-B-94-002, which is available from the National Clearinghouse for Environmental Publications and Information, 11029 Kenwood Road, Cincinnati, OH 45242.

Exhibit 2-20: Public Water System Information
(Adapted from ICR §141.142 Table 6a)

Category	Type of Data		
	Permanent	Monthly	Design
Public Water System	<ul style="list-style-type: none"> Utility name Public water supply identification (PWSID) # Water Industry Data Base (WIDB) # [optional] Official contact person: <ul style="list-style-type: none"> Name Mailing address Phone # [optional] FAX # [optional] ICR contact person: <ul style="list-style-type: none"> Name Mailing address Phone number FAX # [optional] E-mail address [optional] 	<ul style="list-style-type: none"> Sampling dates: (from - to) Retail population on day of sampling Wholesale population equivalent on day of sampling Monthly average retail flow (MGD) Monthly average wholesale flow (MGD) 	<ul style="list-style-type: none"> None
Treatment Plant ¹	<ul style="list-style-type: none"> Plant name ICR plant # assigned by EPA² PWSID # of treatment plant³ State-approved plant capacity (MGD) Historical minimum water temp. (°C) Installed sludge handling capacity (lb/day) 	<ul style="list-style-type: none"> Hours of operation (hrs/day) Sludge solids production (lb/day) Percent solids in sludge (%) 	<ul style="list-style-type: none"> Plant type
Process Train	<ul style="list-style-type: none"> Name 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Process train type

1. Report this information for each treatment plant operated by the PWS.
2. EPA shall assign ICR plant number after the PWS submits sampling plan.
3. PWSID of treatment plant if different from the PWSID reported in the *Public Water System* category above.

Exhibit 2-21: Plant Influent Information
(Adapted from ICR §141.142 Table 6b)

Category	Type of Data	
	Permanent	Monthly
<i>Water Resource</i> ¹	<ul style="list-style-type: none"> Name of resource Type of resource (one of below) <ol style="list-style-type: none"> 1 Flowing stream 2 Reservoir/Lake 3 GW classified as under the direct influence of SW 4 Ground water 5 Purchased finished water 6 Non-Fresh (i.e., salt water) 	<ul style="list-style-type: none"> If Reservoir/Lake: <ul style="list-style-type: none"> Mean Residence Time (days)
<i>Intake—Surface Water</i> ²	<ul style="list-style-type: none"> Location of intake³ <ul style="list-style-type: none"> Latitude and longitude (deg/min/sec) Hydrological unit code⁴ [if known] Stream reach code [if known] River mile number (mile) [if known] Is watershed control practiced? 	<ul style="list-style-type: none"> Flow on day of sampling (MGD)
<i>Intake—Ground Water</i> ^{5,6}	<ul style="list-style-type: none"> Location of intake³ <ul style="list-style-type: none"> Latitude and longitude (deg/min/sec) Hydrological unit code⁴ [if known] Is wellhead protection practiced? 	<ul style="list-style-type: none"> Flow on day of sampling (MGD)
<i>Intake—Purchased Finished Water</i> ⁷	<ul style="list-style-type: none"> Name of supplying utility PWSID of supplying utility 	<ul style="list-style-type: none"> Flow on day of sampling (MGD)
<i>Plant Influent</i> ⁸	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Monthly average flow (MGD) Flow at time of sampling (MGD)

1. Each treatment plant shall have at least one water resource. Each water resource shall have at least one intake. If a treatment plant has more than one water resource, report this information for each water resource.

2. *Intake—Surface Water* describes the physical location of an intake structure located in a river, lake, or other surface water resource.

3. The location of the intake will allow for cross-referencing with other databases containing information on possible contamination threats to the intake.

4. The hydrologic unit code will allow for cross-referencing with other databases containing information on possible contamination threats to the intake.

5. *Intake—Ground Water* describes the physical location of a well.

6. A PWS is not required to report information for ground water that is not treated.

7. A PWS is required to report information on purchased finished water only if that water is further treated.

8. Multiple intakes combine into one *Plant Influent*; each plant has only one *Plant Influent*, which is the point where *Plant Influent* samples, as per Exhibits 1, 2, 3, and 5 of §141.142, will be taken.

Exhibit 2-22: Unit Process Information
(Adapted from ICR §141.142 Table 6c)

Category	Type of Data	
	Monthly	Design
Presedimentation Basin ¹	<ul style="list-style-type: none"> • Liquid volume (gallons) • Surface area (ft²) • Projected tube settler surface area (ft²) • Projected plate settler surface area (ft²) 	<ul style="list-style-type: none"> • Tube settler brand name • Plate settler brand name • Baffling type²
Complete Ozone Contact Basin	<ul style="list-style-type: none"> • Ozone CT (mg min/L)¹⁰ • Ozone <i>Giardia</i> inactivation (logs) • Ozone virus inactivation (logs) • Ozone concentration in feed gas (% by weight) • Total ozone gas flow rate to contactor (SCFM)³ • Type of feed gas used to generate ozone (one from below) 1 Air 2 Oxygen • Total ozone applied dose (mg/L) 	<ul style="list-style-type: none"> • Type of ozone contactor (one of below) 1 Bubble diffusion 2 Turbine • Number of chambers
Each Ozone Contact Chamber	<ul style="list-style-type: none"> • Percent ozone gas flow split to this chamber (%) • Hydrogen peroxide dose (mg/L) 	<ul style="list-style-type: none"> • Chamber sequence number • Liquid volume (ft³) • Surface area (ft²) • Water/Ozone flow regime (one of below) 1 Counter-current 2 Co-current
Washwater Return Point ⁸	<ul style="list-style-type: none"> • Flow of returned washwater at time of sampling (MGD) • 24-hr average flow prior to sampling (MGD) 	<ul style="list-style-type: none"> • Indicate which washwater treatment processes are being used on day of sampling • Is there treatment (Y/N) • If yes: <ul style="list-style-type: none"> Plain sedimentation (Y/N) Coagulation/sedimentation (Y/N) Filtration (Y/N) Disinfection (Y/N) Other treatment (text)

Exhibit 2-22: Unit Process Information (continued)

Category	Type of Data	
	Monthly	Design
<i>Rapid Mix</i>	<ul style="list-style-type: none"> • Mean velocity gradient "G" (sec⁻¹)⁴ • Liquid volume (gallons) 	<ul style="list-style-type: none"> • Type of mixer (one of below) <ul style="list-style-type: none"> 1 Mechanical 3 Static 2 Hydraulic 4 Other • Number of stages • Baffling type²
<i>Flocculation Basin</i>	<ul style="list-style-type: none"> • Mean velocity gradient "G" (sec⁻¹) in each stage⁴ • Liquid volume of each stage (gallons) 	<ul style="list-style-type: none"> • Type of mixer (one of below) <ul style="list-style-type: none"> 1 Mechanical 2 Hydraulic • Number of stages • Baffling type²
<i>Sedimentation Basin</i>	<ul style="list-style-type: none"> • Liquid volume (gallons) • Surface area (ft²) • Projected tube settler surface area (ft²) • Projected plate settler surface area (ft²) 	<ul style="list-style-type: none"> • Tube settler brand name • Plate settler brand name • Baffling type²
<i>Solids Contact Clarifier</i>	<ul style="list-style-type: none"> • Liquid volume (gallons) • Surface area of settling zone (ft²) • Projected tube settler surface area (ft²) • Projected plate settler surface area (ft²) 	<ul style="list-style-type: none"> • Brand name • Type (choose all that apply) <ul style="list-style-type: none"> • Rectangular basin • Reactor-clarifier • Upflow • Sludge blanket • Tube settler brand name • Plate settler brand name • Baffling type²
<i>Adsorption Clarifier</i>	<ul style="list-style-type: none"> • Liquid volume (gallons) • Surface area (ft²) 	<ul style="list-style-type: none"> • Brand name • Baffling type²
<i>Dissolved Air Flotation</i>	<ul style="list-style-type: none"> • Liquid volume (gallons) • Surface area (ft²) • Percent recycle rate (%) • Recycle stream pressure (psi) 	<ul style="list-style-type: none"> • Baffling type²
<i>Recarbonation Basin</i>	<ul style="list-style-type: none"> • Liquid volume (gallons) • Surface area (ft²) 	<ul style="list-style-type: none"> • Baffling type²

Exhibit 2-22: Unit Process Information (continued)

Category	Type of Data	
	Monthly	Design
Filtration	<ul style="list-style-type: none"> • Liquid volume (gallons) • Surface area (ft²) • Average filter run time (hr) 	<ul style="list-style-type: none"> • Media type (one of below) 1 Dual media (anthracite/sand) 2 GAC over sand 3 Tri media (anthracite/sand/garnet) 4 Sand 5 Deep bed monomedia anthracite • Design depth of GAC (inch) • Type and manufacturer of activated carbon • Design media depth (inch) • Minimum water depth to top of media (ft) • Depth from top of media to top of backwash trough (ft) • Media type • Media depth • Media size • None
Slow Sand Filtration	<ul style="list-style-type: none"> • Surface area (ft²) • Average filter run length • Cleaning method 	
Diatomaceous Earth (DE) Filter	<ul style="list-style-type: none"> • Effective DE filter surface • Precoat (lb/ft²) • Bodyfeed (mg/L) • Run length (hours) 	
Granular Activated Carbon - Post-Filter Adsorber	<ul style="list-style-type: none"> • Liquid volume (gallons) • Surface area (ft²) • Carbon volume (ft³) • Empty bed contact time (minutes) • Operating reactivation frequency (days) 	<ul style="list-style-type: none"> • Manufacturer of activated carbon • Type of activated carbon
Membranes	<ul style="list-style-type: none"> • Surface area (ft²) • Percent recovery (%) • Operating pressure (psi) • Operating flux (gpd/ft²) • Cleaning method (hydraulic or chemical) • Cleaning frequency (days) 	<ul style="list-style-type: none"> • Model name • Type (one of below) 1 Reverse osmosis 2 Nanofiltration 3 Ultrafiltration • Number of stages • Molecular weight cutoff (daltons) • Design flux (gpd/ft²) • Design pressure (psi) 4 Microfiltration 5 Electrodialysis

Exhibit 2-22: Unit Process Information (continued)

Category	Type of Data	
	Monthly	Design
Air Stripping	<ul style="list-style-type: none"> Horizontal cross-section area (ft²) Air flow (SCFM)³ 	<ul style="list-style-type: none"> Packing height (ft) Design air to water ratio (volume/volume) Type of packing (Name) Nominal size of packing (inch)
Ion Exchange	<ul style="list-style-type: none"> Liquid volume (gallons) Surface area (ft²) 	<ul style="list-style-type: none"> Resin (Name) Resin Manufacturer Design exchange capacity (equ/ft³)³ Bed depth (ft)
Disinfection Contact Basin^{5,6}	<ul style="list-style-type: none"> Liquid volume (gallons) Surface area (ft²) 	<ul style="list-style-type: none"> Baffling type²
Clearwell⁷	<ul style="list-style-type: none"> Surface area (ft²) Liquid volume (gallons) 	<ul style="list-style-type: none"> Baffling type² Minimum liquid volume (gallons) Covered or open?
Additional Water Sources⁹	<ul style="list-style-type: none"> Flow of additional source (MGD)⁶ 	<ul style="list-style-type: none"> Type of water source (purchased finished water, untreated ground water, treated ground water, untreated surface water, treated surface water, other)
Other Treatment	<ul style="list-style-type: none"> Surface area (ft²) [optional] Liquid volume (gallons) [optional] 	<ul style="list-style-type: none"> Purpose

1. A reservoir to which oxidants, disinfectants, or coagulants are added is considered a *Presedimentation Basin*.

2. Baffling type is classified as one of the following: 1 - Unbaffled (mixed tank), 2 - Poor (inlet/outlet only), 3 - Average (inlet/outlet and intermediate), 4 - Superior (serpentine), 5 - Perfect (plug flow). Information on classifying baffling types may be found in *Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources*, Appendix C.

3. SCFM is standard cubic feet per minute. Equ/ft³ is equivalents per cubic foot.

4. Mean velocity gradient is typically computed as $G = \text{square root of } (P/uV)$, where P = power expended, u = viscosity, and V = liquid volume.

5. *Disinfection Contact Basin* shall have a stable liquid level.

6. *Disinfection Contact Basin* can be used to represent a pipe with a long contact time.

7. A clearwell may have a variable liquid level.

8. The *Washwater Return* marks the point in the process train where washwater joins the main flow.

9. *Additional Water Sources* includes water that is added to the process train after the influent.

10. Ozone CT calculated using the procedure in *Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources*, Appendix O.

Exhibit 2-23: Additional Process Train Information
(Adapted from ICR §141.142 Table 6d)

Category	Type of Data	
	Monthly	Design
<i>Disinfectant Addition</i>	<ul style="list-style-type: none"> • Disinfectants in use at time of sampling • Dose (mg/L) • Chemical formula (e.g., mg/L as chlorine) 	<ul style="list-style-type: none"> • None
<i>Finished Water Sample Point^{1,2}</i> <i>(plant effluent)</i>	<ul style="list-style-type: none"> • Monthly average flow (MGD) • Flow at time of sampling (MGD) 	<ul style="list-style-type: none"> • None

1. This shall mark the end of the treatment plant.
2. Unless the finished water of this treatment plant is blended with finished water from another plant, this point is also the entry point to the distribution system.

Exhibit 2-24: Finished Water Distribution Information
(Adapted from ICR §141.142 Table 6e)

Category	Type of Data	
	Monthly	Design
Entry Point to Distribution System (EPDS) ¹	<ul style="list-style-type: none"> Monthly average flow (MGD) Flow at time of sampling (MGD) 	<ul style="list-style-type: none"> None
Wholesale Information ²	<ul style="list-style-type: none"> Flow at time of sampling (MGD) 	<ul style="list-style-type: none"> Name of Purchaser PWSID of Purchaser
Distribution System	<ul style="list-style-type: none"> Maximum residence time (days) Average residence time (days) Number of disinfection booster stations in operation at time of sampling: <ul style="list-style-type: none"> Chlorine Chloramine Chlorine dioxide Range of distribution system disinfectant dosages <ul style="list-style-type: none"> Chlorine: High - Low (mg/L) Chloramine: High - Low (mg/L) Chlorine dioxide: High - Low (mg/L) 	<ul style="list-style-type: none"> Typical maximum residence time (days) Average residence time (days) Design volume of distribution system storage (million gallons) Total surface area of open reservoirs in distribution system storage (ft²)

1. Multiple treatment plants can feed into one EPDS. If there is only one plant then the EPDS and Finished Water Sample Point are the same.

2. The supplying PWS will report wholesale information for each PWS that purchases finished water.

Exhibit 2-25: Analytical Methods Approved for Subpart M
(Adapted from ICR §141.142 Table 7)

Analyte	Methodology ¹		
	40 CFR Reference ²	EPA Method	Standard Method ³
pH, Alkalinity, Calcium Hardness, Temperature	§141.23(k)(1)		
Turbidity	§141.74(a)(1)		
Disinfectant residuals: free chlorine, total chlorine, chlorine dioxide, ozone	§141.74(a)(2)		
Trihalomethanes: chloroform, bromodichloromethane, dibromochloromethane, bromoform	§141.24(e)	551.1 ⁴	4500-Cl B ⁹
Haloacetic acids: mono/di/trichloro- and mono/dibromo/bromochloroacetic acids		552.1 ⁵ , 552.2 ⁴	
Chloral hydrate		551.1 ⁴	6251 B
Haloacetonitriles: di- and trichloroacetonitrile; bromochloroacetonitrile; dibromoacetonitrile		551.1 ⁴	
Haloketones: 1,1-dichloropropanone; 1,1,1-trichloropropanone		551.1 ⁴	
Chloropicrin		551.1 ⁴	
Chlorite, Chlorate, Bromide, and Bromate		551.1 ⁴	
Total Organic Halide (TOX)		300.0 ⁶	5320 B
Total Organic Carbon (TOC)			5310 B, 5310 C, 5310 D
UV absorbance at 254 nm			5910
Simulated Distribution System Test (SDS)			5710 C
Total Hardness			2340 B ⁷ , 2340 C
Ammonia	§136.3, Table 1b ⁸	350.1 ⁶	4500-NH ₃ D, 4500-NH ₃ G
Chlorine Demand Test			2350 B

1. Analyses shall be conducted using the mandatory analytical and quality control procedures in the *DBP/ICR Analytical Methods Manual*, EPA 814-B-94-002.

2. Currently approved methodology for drinking water compliance monitoring is listed in Title 40 of the Code of Federal Regulations in the sections referenced in this column. The 18th and 19th editions of *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, 1015 Fifteenth St., NW, Washington, DC, 20005, are equivalent for the methods cited in these sections. Therefore, either edition may be used.

3. Except where noted, all methods refer to the 19th edition of *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, 1015 Fifteenth Street NW, Washington, DC 20005.

4. Reprinted in *Reprints of EPA Methods for Chemical Analyses under Information Collection Rule*, EPA 814-B-96-006. Originally in *Methods for the Determination of Organic Compounds in Drinking Water-Supplement III*, EPA 600-R-95-131, August 1995, PB95-261616.

5. Reprinted in *Reprints of EPA Methods for Chemical Analyses under Information Collection Rule*, EPA 814-B-96-006. Originally in *Methods for the Determination of Organic Compounds in Drinking Water-Supplement II*, EPA 600-R-92-129, August 1992, PB9-207703.

6. Reprinted in *Reprints of EPA Methods for Chemical Analyses under Information Collection Rule*, EPA 814-B-96-006. Originally in *Methods for the Determination of Inorganic Substances in Environmental Samples*, EPA 600-R-93-100, August 1993, PB94-121811.

7. The following methods, cited in §141.23(k)(1) of this part, can be used to determine calcium and magnesium concentrations for use in conjunction with these methods: EPA Method 200.7, Standard Method 3111 B, Standard Method 3120 B, or ASTM Method D511-93 B.

8. PWSs may use only the automated electrode method from §136.3, Table 1b.

9. This method is approved only for determining free chlorine residual concentrations in hypochlorite solutions and may not be used for any other disinfectant residual analyses.

Exhibit 2-26: Typical Conventional Filtration Treatment Schematic

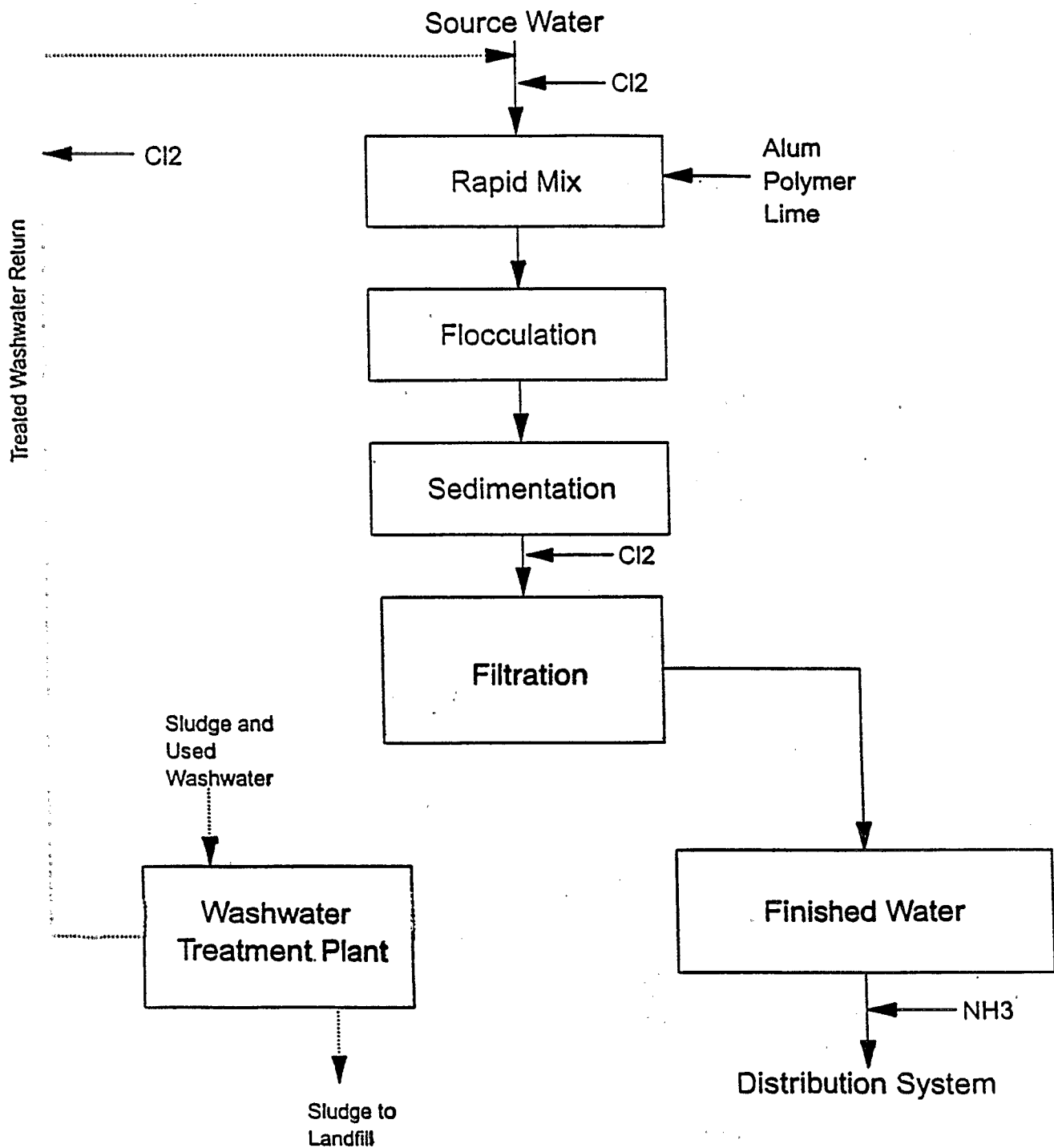
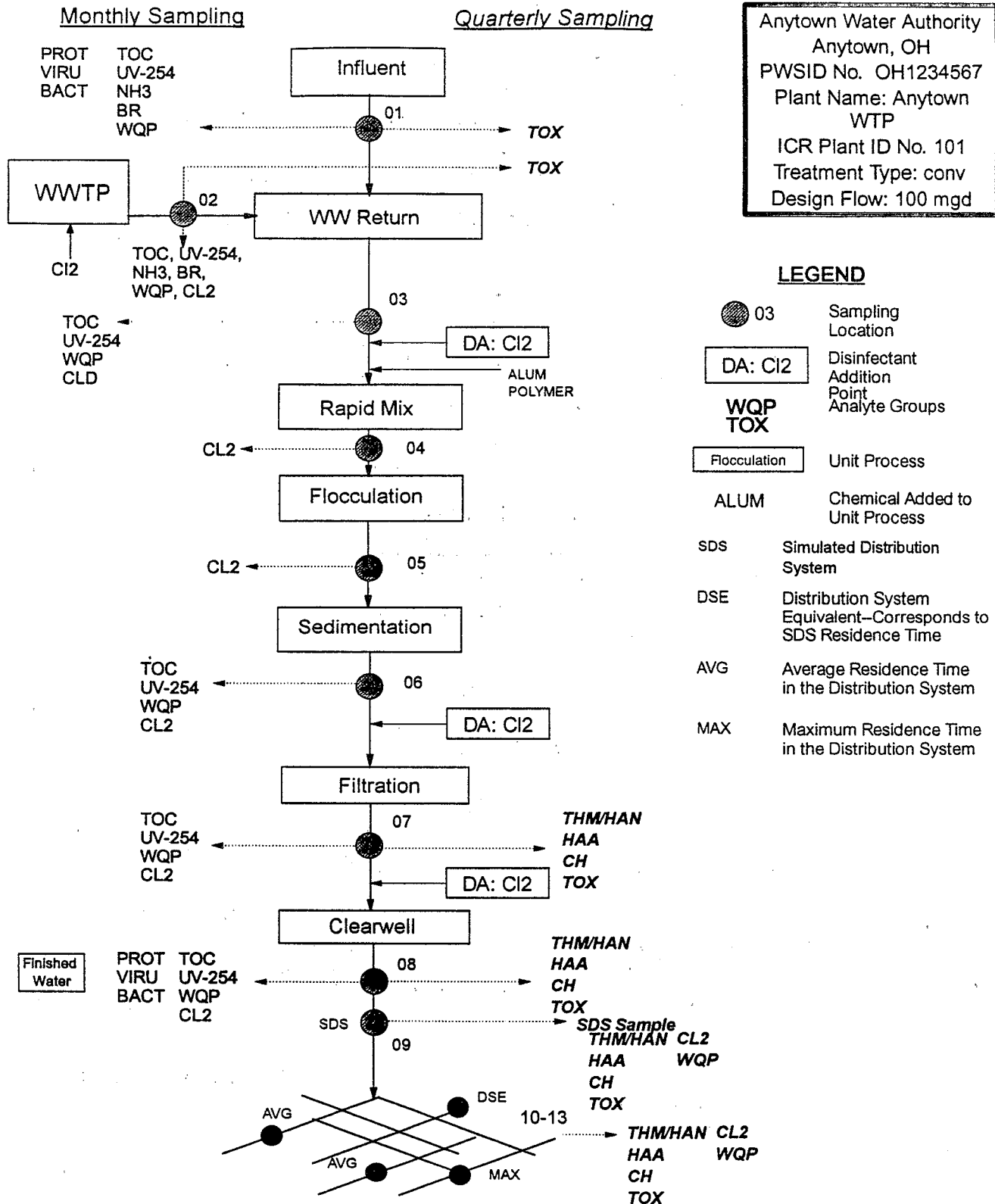


Exhibit 2-27: ICR Initial Sampling Schematic for Typical Conventional Filtration Treatment





Outline: ICR §141.143—Microbial Monitoring Requirements

ICR FR Page and Column
(Reference Manual Page)

- (a) **Monitoring Requirements** 24384, col. 2 (2-71)
 - (1) Parameters 24384, col. 2 (2-71)
 - (2) Monitoring Locations 24384, col. 3 (2-71)
 - (i) Treatment plant influent
 - (A) Sample prior to treatment
 - (B) Treatment plants that have multiple intakes and add chemicals at intake
 - (ii) Finished water
 - (iii) Alternative monitoring requirements
 - (A) Particle counting in treatment plant influent
 - (1) Grab sampling
 - (2) Continuous particle counting
 - (3) Particle count size ranges
 - (B) Sampling and particle counting for *Giardia* and *Cryptosporidium*
 - (iv) Avoiding virus requirements
 - (A) Total culturable virus monitoring
 - (B) Coliform monitoring reports
 - (C) 6-month coliform results
- (b) **Analytical Methods** 24385, col. 3 (2-74)
 - (1) Methods to be Used 24385, col. 3 (2-74)
 - (i) Fecal coliforms
 - (ii) Total coliforms
 - (iii) *E. coli*
 - (iv) *Giardia* and *Cryptosporidium*
 - (v) Total culturable viruses
 - (2) Laboratories 24386, col. 1 (2-73)
 - (3) Archiving of Virus Sample 24386, col. 1 (2-73)
 - (i) Treatment plant influent and finished water - after virus detection in finished water
 - (ii) Treatment plant influent and finished water - after virus detection in any previous source water sample
 - (iii) Sample transmission to EPA
 - (iv) Transmission details

- (c) Reporting 24386, col. 1 (2-76)
 - (1) Format
 - (2) PWSs Complying with Alternative Monitoring Requirements
 - (i) PWSs using alternative specified in (a)(2)(iii)
 - (ii) PWSs not required to monitor for total culturable viruses under (a)(2)(iv)
 - (3) Additional Requirements (Sampling Plans) 24386, col. 2 (2-77)
 - (4) Address for Report Submission 24386, col. 2 (2-77)
 - (5) Data Retention 24386, col. 2 (2-78)

Section Summary: ICR §141.143—Microbial Monitoring Requirements

In general, PWSs that serve $\geq 100,000$ people and use surface water or ground water under the direct influence (GWUDI) of surface water (i.e., Subpart H systems) are required to conduct source water microbial monitoring. Microbial monitoring of water leaving the treatment plant is required only if *Giardia* or *Cryptosporidium* concentrations exceed 10/L or the total culturable virus concentration exceeds 1/L in the source water during the first 12 months of monitoring. Source water monitoring will be monthly for 18 consecutive months and will be concurrent with DBP monitoring. Total coliform and fecal coliform or *E. coli* will be monitored to assess how well they predict the presence and levels of microbial contamination. EPA has included provisions for applying to **avoid** source water virus monitoring and reduced finished water *Cryptosporidium* and *Giardia* monitoring.

Microbial monitoring requirements include monitoring for disease-causing microorganisms, including *Cryptosporidium* and *Giardia*, total culturable viruses, and indicator organisms. This section of the ICR describes microbial monitoring requirements for Subpart H systems, including the samples, monitoring locations, analytical methods, and reporting requirements. Subpart H systems are those utilities using surface water or ground water under the direct influence of surface water as a source. Applicability for microbiological monitoring is presented in the section summary for §141.141—General Requirements, Applicability, and Schedule for Information Collection (see also **Exhibit 2-6**). The flowchart in **Exhibit 2-28** is provided to help determine each utility's microbial monitoring requirements.

(a) MONITORING REQUIREMENTS

(1) PARAMETERS

Under the ICR, densities of the following parameters shall be determined from each sample collected at each treatment plant required to conduct 18 months of microbiological monitoring:

- Total coliforms
- Fecal coliforms or *Escherichia coli*
- *Giardia*
- *Cryptosporidium*
- Total culturable viruses.

Before monitoring starts, a PWS must arrange to have samples analyzed by an EPA-approved laboratory (see Section 7).

(2) MONITORING LOCATIONS

Exhibit 2-29 presents a typical sampling schematic with specific reference to sampling locations relevant to microbial monitoring.

(i) **Treatment Plant Influent**

Affected PWSs are to sample the treatment plant influent once a month for 18 months (**Exhibit 2-6**). The treatment plant influent sample is to be collected upstream of the treatment plant, at a point where waters from all intakes have been blended but no treatment has begun. If it is not possible to sample the treatment plant influent because of the plant configuration, the PWS is to physically sample the **water resource** with the poorest microbiological quality **before** pretreatment or chemical addition. If that is not possible, the water resource with the highest flow is to be sampled.

Treatment plants with multiple intakes without treatment or chemicals added before blending can collect one complete set of samples at the upstream (head) end of the treatment plant where waters from **all** intakes are blended before any treatment or chemical addition. If the intakes are expected to have the same source-water quality, however, one representative intake sample may be taken.

For treatment plants that have multiple intakes and add chemicals at or near the intake (e.g., for zebra mussel control), a flow proportional composite sample (complete set of ICR samples) before chemical addition or pretreatment must be collected. The sample must be taken in the vicinity of the intake in such a manner that the sample is not contaminated by the disinfectant. If the intakes are expected to have the same source-water quality, however, one representative sample may be taken.

(ii) **Finished Water**

A finished water sample is to be collected at each treatment plant when, during the first 12 months of monitoring, microbiological concentrations in the source water exceed certain levels:

- In general, 10 or more *Giardia* cysts, 10 or more *Cryptosporidium* oocysts, or 1 or more total culturable viruses are detected in 1 L of source water.
- Specifically, the numerical value of the *Giardia* or *Cryptosporidium* concentration is calculated to be $\geq 1,000/100$ L or the virus concentration is $\geq 100/100$ L in the source water.
- However, if no pathogens are detected in the source water sample, but the numerical value of the detection limit for *Giardia* or *Cryptosporidium* is calculated to be $\geq 1,000/100$ L (or $\geq 100/100$ L for viruses), finished water monitoring must be conducted.

For each finished water sample, densities of all five of the microbiological parameters identified previously are to be determined. Finished water samples are to be collected after all treatment processes are complete and before the distribution system begins. Finished water monitoring is to begin the month after the PWS becomes aware of the qualifying condition and to continue until the 18 months of treatment plant **influent** monitoring are completed.

(iii) Alternative Monitoring Requirements for *Giardia* and *Cryptosporidium*

PWSs may comply with **either** of the alternative monitoring requirements described below instead of conducting **finished** water monitoring for *Giardia* and *Cryptosporidium*. The PWS must notify EPA of its intention to perform an alternate requirement in the sampling plan submitted in accordance with the microbiological reporting requirement. It is important to note that finished water monitoring still must be conducted for **all other** microbiological parameters. A description of each alternative follows:

- Measure particle counts in treatment plant influent, filter influent, and filter effluent using either grab or continuous particle counting. Particle counting is to be conducted on the same treatment train that is sampled for DBP and related monitoring. Samples are to be collected monthly during the whole 18-month monitoring period using the procedures specified in the *ICR Sampling Manual* (EPA 814-B-96-001, April 1996). [(a)(2)(iii)(A)] The 12 samples (for grab sampling) or the instrument readings (for continuous particle counting) are to be collected over a 24-hour period or the duration of the filter run, whichever is shorter. [(a)(2)(iii)(A)(1)&(2)] The mean value of the 12 samples collected is to be reported for each of the following size categories: 3-5 µm, 5-7 µm, 7-10 µm, and 10-15 µm. [(a)(2)(iii)(A)(3)]
- For at least 4 consecutive months, conduct both *Giardia* and *Cryptosporidium* sampling **and** particle counting. The minimum sample volume is 100 L for treatment plant influent and 1,000 L for treated water. Samples are to be collected at the treatment plant influent, filter influent, and filter effluent. Results obtained from monitoring the treatment plant influent may be used to fulfill this requirement as long as the conditions from both this paragraph and (a)(2)(i) are satisfied. [(a)(2)(iii)(B)]

(iv) Avoiding Virus Requirements

Treatment plants that meet both of the following conditions can be exempted from subsequent virus monitoring requirements:

- Total coliforms, fecal coliforms, or *E. coli* have been monitored in the treatment plant influent for at least 5 days a week for any 6-month period beginning after January 1, 1994; **AND**
- Ninety percent of all samples taken in that period contained ≤100 total coliforms/100 mL, 20 fecal coliforms/100 mL, or 20 *E. coli*/100 mL.

This exemption, however, does **not** apply to treatment plants that are required to (see Finished Water above) conduct finished water monitoring; such systems must conduct **both** finished water and treatment plant influent monitoring of total culturable viruses for the entire 18-month monitoring period. [(a)(2)(iv)(A)]

Coliform data collected under §141.71(a)(1), Source Water Quality Conditions, may be used to satisfy these virus monitoring exemption conditions, providing separate monitoring

reports are submitted for §141.71(a)(1) and for this section's reporting requirements. [(a)(2)(iv)(B)]

If the 6 months of coliform data are not submitted to EPA with the PWS's response to the Notice of Applicability, the PWS is to begin virus monitoring. If a PWS begins virus monitoring and then provides EPA with the coliform data, subsequent virus monitoring for that treatment plant can then be avoided. [(a)(2)(iv)(C)]

(b) ANALYTICAL METHODS

A major issue during the implementation of the ICR is the quality of the data generated during the monitoring period. The data must be both accurate and precise to meet the ICR objectives. It is inherently difficult to ensure data quality considering that the data are to be generated by many laboratories. Maintaining data comparability between laboratories will be necessary to use the data for sophisticated correlational analyses. EPA will assist the drinking water industry in identifying qualified (i.e., approved) laboratories for performing the analyses required by the ICR.

PWSs are required to use the EPA-approved analytical methods for pathogens and indicator organisms. Additional information on sample collection is available in the *ICR Sampling Manual*, which is referenced in the rule along with other manuals. The microbial sampling procedures, however, are new to many of the systems and are described in detail in a video and companion guide titled *ICR: Protozoa and Enteric Virus Sample Collection Procedures* (EPA 814-V-95-001). (See Section 5 of this reference manual.)

(1) METHODS TO BE USED FOR MICROBIOLOGICAL MONITORING

- **Fecal Coliforms.** Use the methods specified in §141.74(a)(1). Note that when paired source water and finished water samples are collected, only the EC Medium fecal coliform procedure (Standard Method 9221E) can be used. The time between sample collection and analysis is not to exceed 8 hours. Samples are to be chilled, shipped, and stored, if not processed immediately, at a temperature of $<10^{\circ}\text{C}$. Those that arrive frozen or at a temperature of $>10^{\circ}\text{C}$ will not be analyzed. [(b)(1)(i)]
- **Total Coliforms.** Use the method specified in §141.74(a)(2). The time between sample collection and analysis is not to exceed 8 hours. Samples are to be chilled, shipped, and stored, if not processed immediately, at a temperature of $<10^{\circ}\text{C}$. Again, those that arrive frozen or at a temperature of $>10^{\circ}\text{C}$ will not be analyzed. [(b)(1)(ii)]
- **E. Coli.** Use the methods specified in §141.21(f)(6)(i)-(iii) plus the density. PWSs using the EC+MUG and ONPG-MUG tests are to use either a 5- or 10-tube 10-mL configuration with serial dilutions of the original sample as needed and report the Most Probable Number (MPN). A commercial multi-test system may be used for enumeration if the following procedures are followed:
 - Use M-Endo medium for the initial isolation of the organisms
 - Pick every colony on the plate with the appearance of a total coliform
 - Streak every colony for purification before subjecting it to a multi-test system.

The time between sample collection and analysis is not to exceed 8 hours. Samples are to be chilled, shipped, and stored, if not processed immediately, at a temperature of $<10^{\circ}\text{C}$. Those that arrive frozen or at a temperature of $>10^{\circ}\text{C}$ will not be analyzed. [(b)(1)(iii)]

- ***Giardia and Cryptosporidium.*** Use the ICR Protozoan Method, described in the *ICR Microbial Laboratory Manual* (EPA 600/R-95-178, April 1996) and in *Protozoa Video and Companion Guide: ICR Protozoan Method for Detecting Giardia Cysts and Cryptosporidium Oocysts in Water by a Fluorescent Antibody Procedure* (EPA 814-V-95-003). The minimum sample volume is 100 L for treatment plant influent and 1,000 L for partially treated or finished water. [(b)(1)(iv)]
- ***Total Culturable Viruses.*** Use the Virus Monitoring Protocol described in the *ICR Microbial Laboratory Manual* (EPA 600/R-95-178, April 1996) and in *Virus Video and Companion Guide: Virus Monitoring Protocol for the Information Collection Rule* (EPA 814-V-95-002). [(b)(1)(v)]

(2) LABORATORIES

PWSs must use EPA-approved laboratories to analyze for *Giardia*, *Cryptosporidium*, and total culturable viruses. Laboratory approval criteria for *Giardia*, *Cryptosporidium*, and total culturable viruses can be found in the *ICR Microbial Laboratory Manual* (EPA 600/R-95-178, April 1996).

For the analysis of total coliforms, fecal coliforms, and *E. coli*, PWSs must use laboratories certified for microbiology analyses by either EPA or a State under the EPA or State drinking water program. For information on the laboratory approval process, see Section 7 of this reference manual.

(3) SAMPLES TO BE ARCHIVED

PWSs are to send properly prepared samples of treatment plant influent and finished water to the ICR Virus Archiving Coordinator according to the procedures specified in Chapter VIII of the *ICR Microbial Laboratory Manual* (EPA 600-R-95-178, April 1996) for every month after either of the following conditions occur:

- The PWS becomes aware that viruses were detected in any previous sample of finished water. [(b)(3)(i)]
- The PWS learns that a density of ≥ 10 viruses/L was detected in any previous treatment plant influent water sample, regardless of whether viruses were detected in the finished water. [(b)(3)(ii)]

PWSs may arrange to have virus samples shipped directly to EPA by its virus laboratory for samples that are to be archived. [(b)(3)(iii)]

(c) REPORTING**(1) FORMAT**

Monthly sampling results will be entered by the utility into the ICR Water Utility Database System as they are received from the laboratories and reviewed by utility personnel. Data are not to be transferred to EPA until all of the monthly sampling results for a particular sampling period have been received, reviewed, and entered into the database system. This could take several months, especially in the case of the virus results. When all of the sampling results have been received and entered, the utility will submit a monthly report (diskette) to EPA that indicates the analytical results of all samples collected for the sampling period (including quarterly samples collected in that month), and all of the relevant plant operational data. These data must be submitted to EPA on diskette no later than the fourth month following the month in which the samples were collected.

PWSs, using an EPA-specified computer readable format to report data and information collected under the ICR, are required to submit a monthly report on the analytical results of all samples collected, including:

- Public Water Supply Identification (PWSID) Number
- ICR plant identification number
- Sample date
- Analysis date
- Laboratory identification numbers
- Analytical methods used
- Sample identification numbers
- Analytical batch numbers
- Quality assurance code
- Processing batch numbers, if appropriate.

This report is to be submitted on diskette with the DBP and other PWS data no later than the fourth month following sampling.

(2) REQUIREMENTS FOR PWSs COMPLYING WITH ALTERNATIVE MONITORING OR AVOIDING VIRUS MONITORING PROVISIONS

PWSs complying with the alternative to *Giardia* and *Cryptosporidium* monitoring requirements (particle counting) summarized on page 2-73 must report the mean value for each size category of the 12 particle-counting values collected over the sampling period. Those systems conducting the 4 months of *Giardia* and *Cryptosporidium* sampling (also described on page 2-73) must report the densities of *Giardia* and *Cryptosporidium* at each measured site. This information must be submitted to EPA by the fourth month following sampling. [(c)(2)(i)]

PWSs avoiding virus monitoring requirements under the provisions discussed on page 2-73 must report the dates and results of all total coliform, fecal coliform, or *E. coli* monitoring used to determine that additional virus monitoring is not necessary. The PWS

is to submit a report detailing all the data collected during the 6-month period and how this data was used to calculate compliance. [(c)(2)(ii)]

(3) ADDITIONAL REQUIREMENTS (SAMPLING PLANS)

Using EPA-provided software, PWSs are required to submit a sampling plan for each treatment plant conducting monitoring to EPA for approval. PWSs required to comply with ICR requirements must submit sampling plans to EPA for review and approval no later than 8 weeks after receiving the final applicability letter from EPA. The initial sampling plan must be developed by the utility for each treatment plant affected by the ICR and will include the plant design parameters for each unit process in each process train for each treatment plant, the location of each sampling point, and the analytical parameters to be monitored at each sampling point.

EPA's *ICR Water Utility Database System Users' Guide* contains data entry worksheets that will aid in the collection and entry of the plant design parameters. The data entry software will be used to develop the plan. A video will be provided by EPA to each PWS to introduce utility personnel to the software. Training courses will also be offered by AWWA in September and October of 1996 to provide "hands-on" instruction in the use of the software. Additional help on the use of the software will be available from the AWWA A-Team and through the ICR Data Management System Hotline (see Section 4 of this reference manual).

The sample plan must be submitted to EPA on diskette using the data entry software. The initial sampling plan must indicate sampling point locations and the monitoring to be conducted at each point. Once EPA notifies the PWS that the plan has been approved, the PWS must begin monitoring the following month.

Exhibit 2-29 presents an Initial Sampling Schematic (ISS) based on the typical treatment plant schematic in Exhibit 2-26 in §141.142. The AWWA A-Team will develop ISSs for each treatment plant in all affected PWSs. ISSs will be mailed to utilities by the middle of August 1996. The ISSs will be used to develop initial sampling plans (ISPs) in the Water Utility Database System. The initial sampling plan, along with the ISS, is to be submitted to EPA no later than 8 weeks after the PWS receives a Notice of ICR Final Applicability Determination required by §141.143(c)(3)(ii).

(4) REPORTING ADDRESS

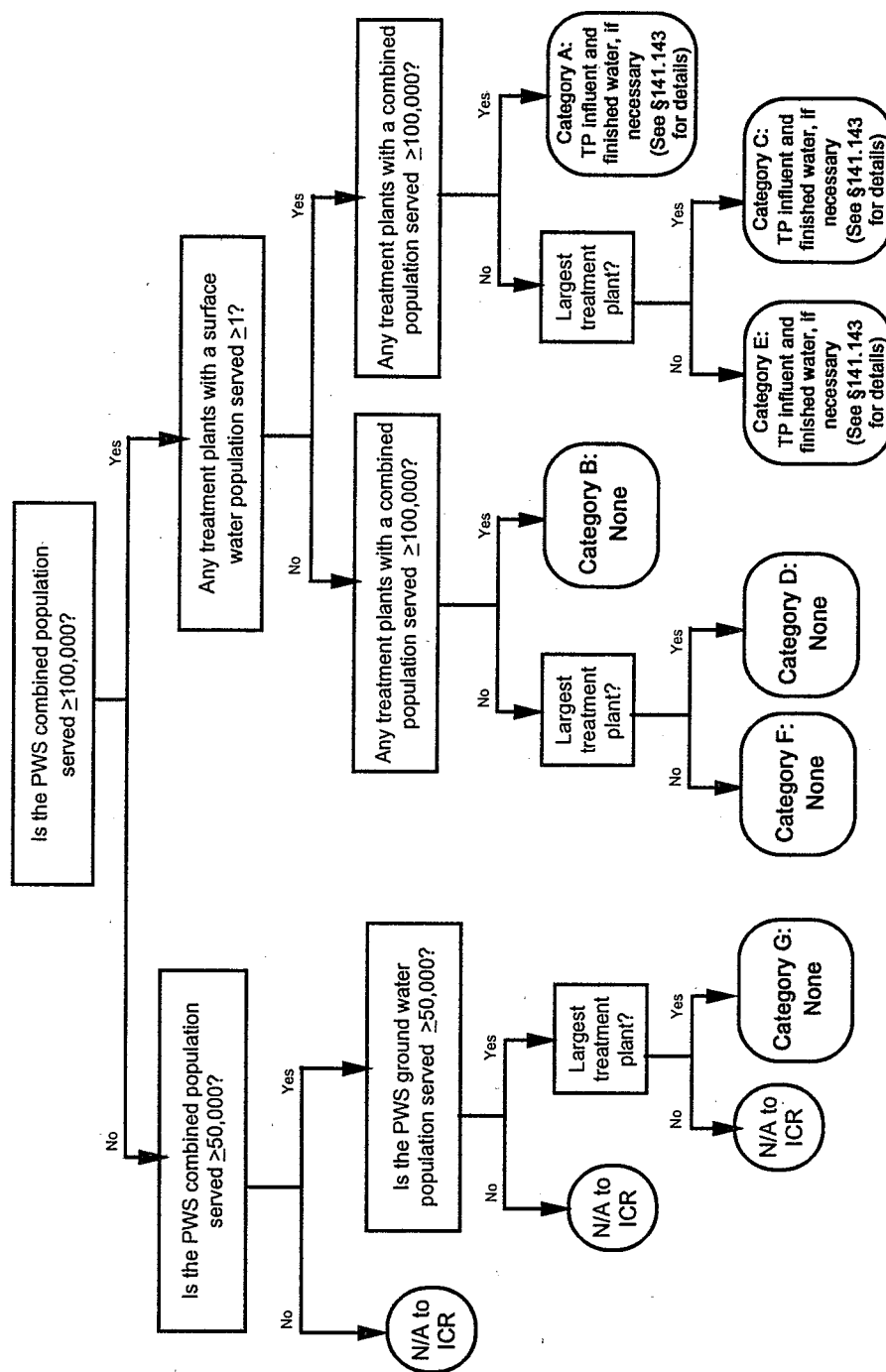
All data reports required by this section are to be submitted to EPA at the following address:

USEPA (ICR4600)
ICR Data Center
1111 East Tower
401 M Street, SW
Washington, DC 20460.

(5) DATA RETENTION

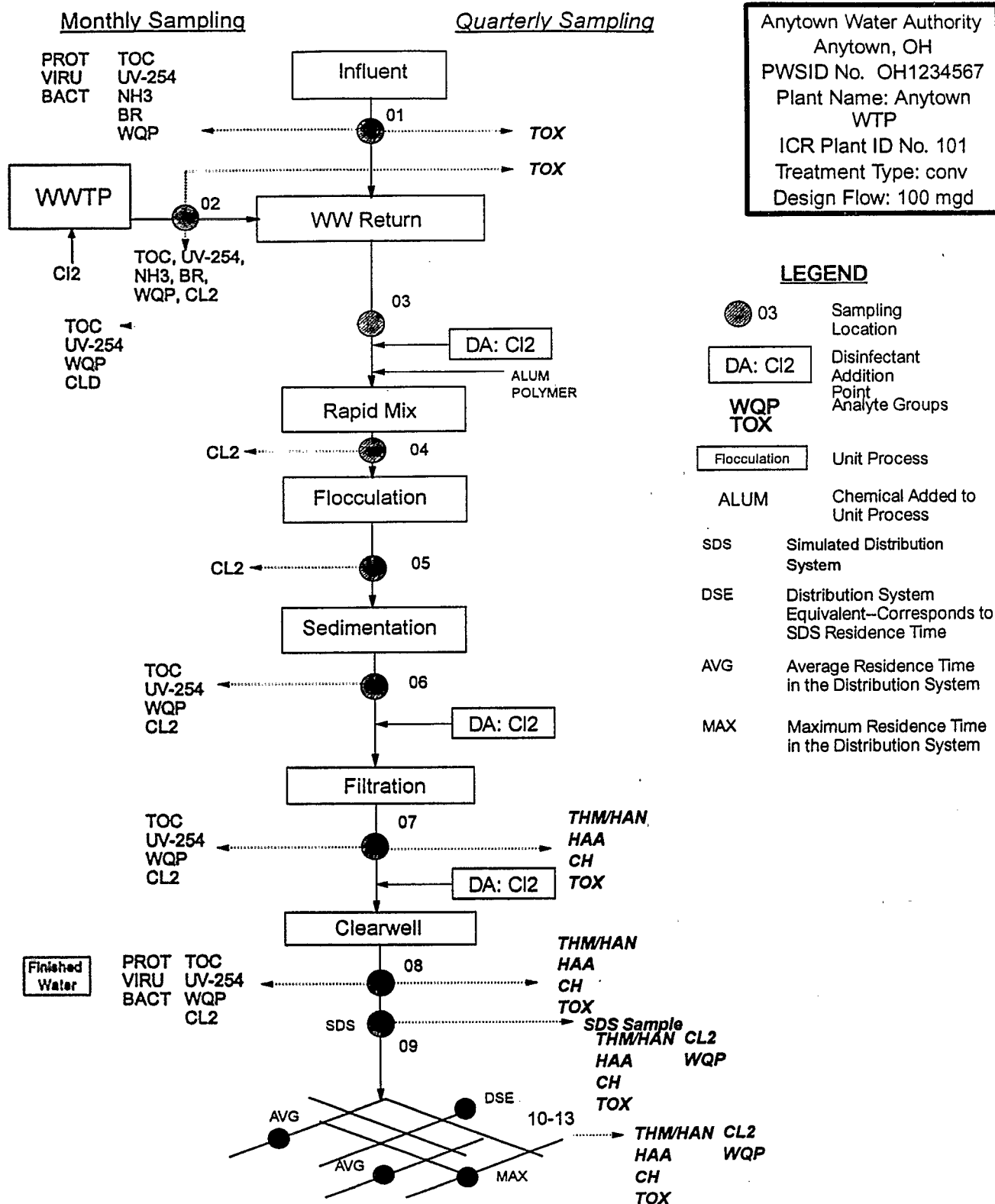
PWSs are required to keep all data for at least 3 years following data submission to EPA.

Exhibit 2-28: Microbiological Requirements by Treatment Plant Category



Key: N/A: Not Applicable
PWS: Public Water System
TP: Treatment Plant

Exhibit 2-29: ICR Initial Sampling Schematic for Typical Conventional Filtration Treatment



Outline: ICR §141.144—DBP Precursor Removal Studies (Treatment Studies)

ICR FR Page and Column (Reference Manual Page)

- (a) **TOC, UFCTOX, THM4, and HAA5 Applicability Monitoring** . 24386, col. 2 (2-83)
- (b) **Treatment Study Requirements** 24386, col. 3 (2-84)
 - (1) **Bench-scale Tests** 24386, col. 3 (2-85)
 - (i) GAC bench-scale testing
 - (ii) Membrane bench-scale testing
 - (2) **Pilot-scale Tests** 24387, col. 2 (2-86)
 - (i) GAC pilot-scale testing
 - (A) Procedural, monitoring, and reporting requirements
 - (B) EBCT tests
 - (C) Pilot test run lengths
 - (ii) Membrane pilot-scale testing
 - (A) Procedural, monitoring, and reporting requirements
 - (B) Membrane test system design
 - (C) Pilot test run lengths
 - (3) **Simulated Distribution System Conditions** 24387, col. 3 (2-87)
- (c) **Analytical Methods** 24387, col. 3 (2-88)
- (d) **Reporting** 24387, col. 3 (2-88)
 - (1) TOC, UFCTOX, THM4, and HAA5 Reporting
 - (2) Treatment Study Reporting Requirements
 - (3) Address for Report Submission



Section Summary: ICR §141.144—DBP Precursor Removal Studies (Treatment Studies)

In general, PWSs that serve $\geq 100,000$ people are required to conduct treatment study applicability monitoring and treatment studies (unless certain criteria are met) at treatment plants serving at least 100,000 people (or at the largest treatment plant in the PWS if no individual plant serves 100,000). PWSs that serve between 50,000 and 100,000, with at least 50,000 people served by ground water, are also required to conduct treatment study applicability monitoring and treatment studies (unless certain criteria are met) at the largest treatment plant in the PWS. PWSs must conduct treatment study applicability monitoring (i.e., TOC) for 12 months at specified locations to determine at which treatment plants they must conduct treatment studies. Bench- or pilot-scale studies will determine the effectiveness of granular activated carbon (GAC) or membranes in reducing the levels of DBP precursors and must be designed to yield representative performance data and to allow the development of treatment cost estimates for different levels of DBP control. EPA will provide technical manuals on the study protocols (e.g., *ICR Manual for Bench- and Pilot-scale Studies*, EPA 814-B-96-003). EPA has included provisions for avoiding studies, conducting joint studies with other PWSs, using previous studies ("grandfathering"), and contributing to a research fund (i.e., buyout option) in lieu of conducting studies.

This section of the ICR describes the requirements, analytical methods, and reporting responsibilities for systems conducting treatment study applicability monitoring and DBP precursor removal studies. Applicability for treatment studies is presented in the section summary for §141.141—General Requirements, Applicability, and Schedule for Information Collection (see also **Exhibit 2-7**). The flowchart in **Exhibit 2-30** has been provided to aid in determining each utility's treatment study requirements.

(a) TOC, UFCTOX, THM4, AND HAA5 APPLICABILITY MONITORING

Treatment study applicability monitoring is conducted to determine whether the treatment plant precursor levels are low enough to avoid the treatment study requirement and whether two or more treatment plants qualify for a common source designation.

If the 18-month DBP monitoring overlaps the treatment study applicability monitoring, the same results can be used for both monitoring requirements. However, the time periods must overlap. PWSs required to conduct treatment study applicability monitoring are to monitor for the following:

- **TOC.** Treatment plants using surface water and ground water under the direct influence of surface water must monitor treatment plant influent, and those using ground water must monitor finished water, for TOC monthly for 12 months. Treatment plants using ground water must monitor finished water for TOC monthly for 12 months. TOC analysis must be conducted by a laboratory approved by EPA as described in the DBP section of the rule. Treatment plants using surface water are excused from conducting treatment studies if they do not exceed an annual average TOC of 4.0 mg/L in the treatment plant influent, based on the 12 monthly

TOC samples. Treatment plants using only ground water are excused from conducting treatment studies if they do not exceed an annual average TOC of 2.0 mg/L in the finished water, based on 12 monthly TOC samples.

- **UFCTOX.** Total organic halides formed under the uniform formation conditions (UFCTOX) monitoring is only required of treatment plants seeking to: (1) qualify for a joint treatment study on the basis of having river intakes between 20 and 199 miles apart with a mean water resource UFCTOX within 10 percent of the mean UFCTOX of all the treatment plant influents (based on UFCTOX analytical results of the same 12 months for all participating treatment plants); or (2) qualify for the contributing funds alternative (i.e., the "buyout option") to conducting a treatment study, which requires a common water resource designation.
- **THM4 and HAA5.** Only treatment plants seeking to avoid conducting treatment studies on the basis that they use chlorine as the primary and residual disinfectant and have annual average levels of THM4 <40 µg/L and HAA5 <30 µg/L need to conduct THM4 and HAA5 treatment study applicability monitoring. Quarterly averages are the arithmetic averages of the four distribution system samples (i.e., one sample point representative of the maximum residence time for the treatment plant and three sample locations representative of the average residence time in the distribution system for the treatment plant).

(b) TREATMENT STUDY REQUIREMENTS

Treatment studies consist of bench and/or pilot-scale systems for one or two candidate technologies for the reduction of DBP precursors. Candidate technologies include GAC and membrane processes, specifically nanofiltration and reverse osmosis. The purpose of requiring treatment studies is to:

- Gather representative performance data.
- Enable the development of national treatment cost estimates for different levels of organic DBP control.

The treatment studies must be designed to yield representative performance data and to allow the development of treatment cost estimates for different levels of organic DBP control. To simulate the most likely treatment scenario, treatment studies will need to be performed with the effluent from the treatment processes that are already in place to remove DBP precursors and TOC.

The treatment objective of the studies is to achieve annual averages of disinfection byproducts <40 µg/L for THM4 and <30 µg/L for HAA5. Again, treatment studies should be performed with the effluent from in-place treatment processes that remove DBP precursors and TOC. The test water for both bench- and pilot-scale tests is to be obtained before the point where oxidants or disinfectants are added (to minimize the formation of DBPs). Bench- and pilot-scale treatment processes representing the full-scale treatment process are required before the GAC or membrane process if the use of oxidants or disinfectants precedes any full-scale treatment process that removes DBPs. Sound

judgment is expected in the selection of treatment processes and sampling points. For further details on treatment study requirements and applicability, consult the *ICR Manual for Bench- and Pilot-scale Treatment Studies* (EPA 814-B-96-003, April 1996).

(1) BENCH-SCALE TESTS

Bench-scale tests are continuous flow tests using rapid small-scale column tests (RSSCTs) for GAC and either flat-sheet or single-element bench test apparatus for membranes. EPA has provided utilities flexibility to select a bench-scale protocol appropriate for its circumstance.

Water used in bench-scale tests must be representative of water that would be applied to the advanced treatment full-scale technology.

For further details on both approaches, consult the *ICR Manual for Bench- and Pilot-scale Treatment Studies* (EPA 814-B-96-003, April 1996).

(i) GAC Bench-scale Tests

GAC bench-scale testing should include information on the experimental conditions and results necessary to adequately determine the scaled-up breakthrough curves under the conditions of two RSSCTs. Using the RSSCT, two empty bed contact times (EBCTs) will be tested: 10 and 20 minutes. RSSCTs should be conducted quarterly over 1 year to determine seasonal variation, resulting in four RSSCTs at each EBCT tested. If seasonal variation is not significant, the PWS may conduct the four runs at 10 and 20 minute EBCTs to investigate other parameters in the manual.

If the first quarter RSSCTs result in effluent TOC reaching 70 percent of the average influent TOC within 20 and 30 full-scale equivalent days on the 10- and 20-minute EBCT tests, respectively, the last three quarterly tests should be conducted using the membrane bench-scale testing with only one membrane (see Membrane Bench Scale Testing on the next page for a description).

The RSSCT testing should run until one of the following conditions is met:

- The effluent TOC concentration is ≥ 70 percent of the average influent TOC concentration (the average influent TOC is the running average of the influent TOC at the time of effluent sampling)
- The effluent TOC reaches a "plateau" at >50 percent of the influent TOC (the effluent concentration does not increase over a 2-month full-scale equivalent time period by >10 percent of the average influent TOC concentration)
- An RSSCT operation time is equivalent to 1 year of full-scale operation.

(ii) Membrane Bench-scale Testing

Membrane bench-scale testing should include information on the experimental conditions and results necessary to determine the water quality produced by the membrane treatment and a preliminary estimate of productivity. The following two options exist:

- **Quarterly Studies.** Investigate at least two different membrane types (e.g., rapid bench-scale membrane test or RBSMT and single element bench-scale test or SEBST) with nominal molecular weight cutoffs of less than 1,000 Daltons (i.e., a unit of mass). Conduct tests quarterly over 1 year to evaluate seasonal variation, resulting in a total of eight bench-scale tests. If seasonal variation is not significant, the PWS may conduct the four runs on two membranes at any time. Some variables that a PWS may wish to investigate include pretreatment, additional membrane types, and operating parameters such as flux and recovery.
- **Year-long Study.** Conduct a long-term, single element study with one type of membrane, using the SEBST procedure described in the *ICR Manual for Bench- and Pilot-scale Treatment Studies* (EPA 814-B-96-003, April 1996).

Three options for bench-scale membrane testing are provided to allow some flexibility in meeting the ICR requirements. The RBSMT can be run offsite and offers a great deal of operational flexibility; a simple element test may provide better data but must be conducted onsite and would require long-term operator attention and a continuous supply of treated, unchlorinated feed water. The long-term SEBST study provides the most flux data, but only for one membrane type. Regardless of the approach selected, the membranes investigated must be evaluated with respect to productivity and permeate quality, including precursor removal as assessed under SDS conditions.

(2) PILOT-SCALE TESTS

Pilot-scale tests should be conducted as continuous flow tests using GAC or membrane technologies. Testing and reporting requirements for pilot-scale tests can be found in the *ICR Manual for Bench- and Pilot-scale Treatment Studies* (EPA 814-B-96-003, April 1996).

(i) GAC Pilot-scale Tests

For GAC pilot-scale tests, the PWS must use the following:

- A GAC of particle size representative of full-scale practice
- A pilot GAC column with a minimum inner diameter of 2.0 inches
- A hydraulic loading rate (volumetric flow rate/column cross-sectional area) representative of that used in full-scale practice.

EBCTs of 10 and 20 minutes are to be tested at pilot-scale plants and additional EBCTs can be investigated. Pilot-scale tests should continue until either of the following conditions is met:

- The effluent TOC concentration is ≥ 70 percent of the average influent TOC concentration (the average influent TOC is the running average of the influent TOC at the time of effluent sampling) on at least two consecutive TOC sample dates at least 2 weeks apart
- The effluent TOC concentration reaches a "plateau" at >50 percent of the influent TOC (i.e., the effluent TOC does not increase over a 2-month period by more than 10 percent of the average influent TOC concentration).

If either of these criteria is satisfied for the 20-minute EBCT before 6 months run time, a **second** pilot test at each EBCT is to be conducted under the same sampling requirements. The maximum length for all pilot studies is 1 year. Pilot-scale tests should be designed to capture seasonal variation. If seasonal variation is not a factor, other variables should be investigated.

(ii) *Membrane Pilot-scale Testing*

PWSs are to design pilot-scale membrane systems as staged arrays of elements as specified in the *ICR Manual for Bench- and Pilot-scale Treatment Studies* (EPA 814-B-96-003, April 1996). Pilot-scale testing is to run continuously for 1 year, allowing for down-time for membrane cleaning, maintenance, or other reasons. The pilot-scale run time will be no less than 6,600 hours, which represents approximately 76 percent of 1 calendar year. Membrane test systems are to be operated at a recovery representative of full-scale operation, and the following information is to be collected:

- Loss of productivity (fouling)
- Pretreatment conditions
- Cleaning requirements
- Permeate quality.

A pilot system must use standard elements at least 2.5 inches in diameter by 40 inches in length. This size requirement is for membranes in spiral-wound configurations; standard hollow-fiber elements can also be used, although hollow-fiber technology is not recommended for surface waters. The system must consist of at least two stages, with a minimum of two pressure vessels in the first stage and one pressure vessel in the second stage (i.e., a 2-1 array). Each pressure vessel must contain at least three membrane elements.

(3) **SIMULATED DISTRIBUTION SYSTEM (SDS) CONDITIONS**

Simulated Distribution System (SDS) conditions with chlorine, as described in the *ICR Manual for Bench- and Pilot-scale Treatment Studies* (EPA 814-B-96-003, April 1996), should be used to evaluate chlorine demand and the formation of THM4, HAA6, and TOX. SDS conditions represent average conditions in the distribution system at that time with respect to the following factors:

- Holding or incubation time
- Temperature

- pH
- Free chlorine residual.

When chlorine is not used as the final disinfectant in practice, a chlorine dose should be set to yield a free chlorine residual of at least 1.0 to 0.5 mg/L after a holding time, temperature, and pH equal to those representative of the distribution system averages.

(c) ANALYTICAL METHODS

All treatment study applicability monitoring will be conducted using the methods and the mandatory quality control procedures contained in either of the following:

- *DBP/ICR Analytical Methods Manual* (EPA 814-B-96-002, April 1996)
- *ICR Manual for Bench- and Pilot-scale Treatment Studies* (EPA 814-B-96-003, April 1996).

Additionally, the TOC analyses will be conducted by laboratories that have received approval from EPA to perform TOC analysis for compliance with this rule. It is recommended that EPA-approved laboratories also analyze the UFCTOX, THM4, and HAA5 samples collected during treatment study applicability monitoring, although approved laboratories are not required under the ICR for these analyses.

(d) REPORTING

PWSs have to report all data collected under the treatment study applicability monitoring and treatment study requirements of this section in a report form (i.e., not electronically).

(1) TOC, UFCTOX, THM4, AND HAA5 APPLICABILITY MONITORING

The treatment study applicability monitoring must begin no later than September 30, 1996 (see July 24, 1996 William Diamond letter). Specifically, monthly sampling of TOC (and UFCTOX if required for a common source designation) must begin no later than August 14, 1996. If distribution system DBP samples are to be used to demonstrate treatment study applicability, then quarterly sampling of THM4 and HAA5 distribution system samples must begin between August 14 and November 14, 1996 (between 3 and 6 months after the publication of the final rule).

PWSs are to submit the monthly results for the 12 months of monitoring and the annual average of those monthly results by October 14, 1997 (17 months after publication of the final rule). This report does not have to be submitted electronically. If results from DBP monitoring are used to fulfill these requirements, separate reports must be submitted. A form for reporting applicability data is included in the manual. [(d)(1)]

(2) TREATMENT STUDIES

All data gathered under treatment studies requirements are to be submitted to EPA by July 14, 1999 (38 months after publication of the final rule) in the format specified in the *ICR*

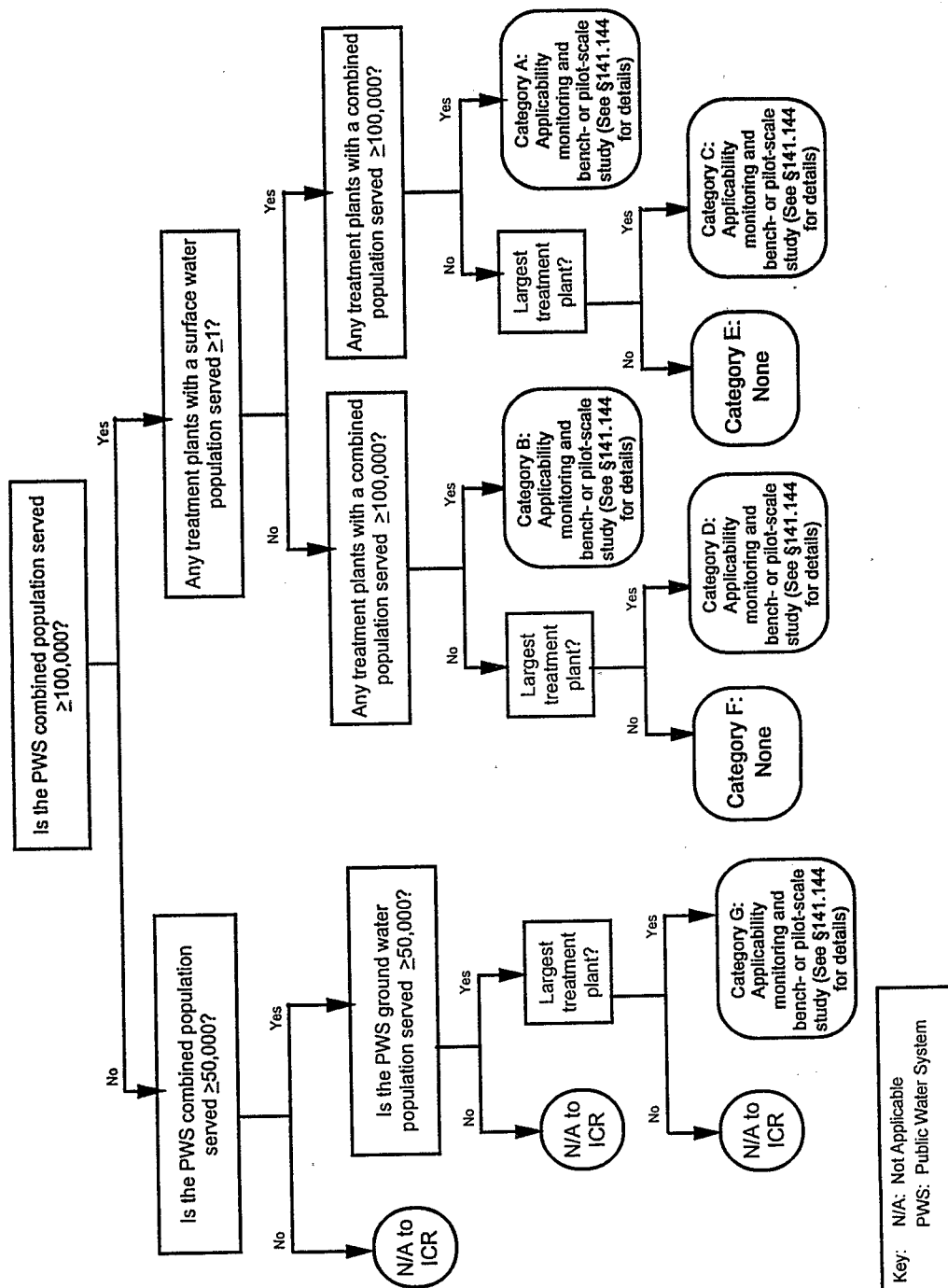
Manual for Bench- and Pilot-scale Treatment Studies. PWSs conducting bench- and pilot-scale studies are also required to report the information for water resource, full-scale, and pilot-/bench-scale pretreatment processes that precede the bench/pilot systems. [(d)(2)]

(3) ADDRESS FOR REPORT SUBMISSION

All reports concerned with treatment studies should be submitted to EPA at the following address: [(d)(3)]

ICR Precursor Removal Studies Coordinator
EPA – Technical Support Center
26 W. Martin Luther King Drive
Cincinnati, OH 45268.

Exhibit 2-30: Treatment Study Requirements by Treatment Plant Category



ATTACHMENT A: Frequently Asked Questions

APPLICABILITY/COVERAGE

PWSs AFFECTED

■ Which utilities must comply with the ICR?

In general, utilities that serve more than 100,000 people are subject to all of the ICR requirements. Utilities using ground water and serving between 50,000 and 100,000 will have to monitor for TOC on a monthly basis. However, the final ICR has detailed directions on determining the applicability of the ICR to a specific utility. The final ICR was published in the *Federal Register* on May 14, 1996. EPA will be sending Notification Letters early in June to those utilities that appear to be subject to the ICR. However, if a utility does not receive a Notification Letter and it is required to sample under the ICR based on the applicability criteria in the rule, it must still monitor. Utilities in this situation are encouraged to contact EPA-TSD in Cincinnati.

■ Our utility uses only ground water which we chlorinate, and we serve only 75,000 people. Do we have to comply with the ICR?

You have to comply with limited TOC monitoring no later than 3 months after the ICR is published in the *Federal Register*, which means start monthly TOC monitoring before September 30, 1996. You are required to monitor for TOC for 12 months in your finished water to determine if you have to perform a precursor removal study using GAC or membranes. You should receive a letter from EPA explaining all of this in June. If you meet the requirements for TOC monitoring and do not hear from EPA in June, you should contact EPA.

■ What happens if my PWS gets a Notice of Applicability for this rule in error?

The PWS will respond to the Notice of Applicability, completing the tables in Appendix A to §141.141(a). Once EPA has approved the calculations that indicate that the PWS does not meet the applicability criteria for the ICR, EPA will notify the PWS that it is not covered and no further action by the PWS is required.

■ What about systems that use a combination of surface water and ground water (not under the direct influence of surface water) sources?

The PWS must respond to the Notice within the required time by completing applicability calculations in Appendix A in §141.141(a). Once EPA has reviewed and concurred with the calculations, the Agency will notify the PWS with a preliminary determination of how the ICR applies to each of the PWS's treatment plants. Proper sampling procedures and locations will be approved by EPA as part of the Agency's review and approval of the sampling plans submitted by PWSs prior to commencing microbial and DBP and related monitoring. PWSs must conduct microbial monitoring

at each treatment plant that uses surface water as any part of its source. PWSs must conduct DBP and related monitoring at each treatment plant, no matter the source.

■ **What if I have multiple wells and no central treatment plant?**

The PWS may treat multiple wells drawing from the same aquifer as one treatment plant and monitor accordingly. [§141.141(a)(3)]

■ **When and how will EPA fund surveys of smaller water systems?**

Because PWSs serving less than 100,000 people are no longer required to conduct microbiological monitoring, EPA intends to conduct two sample surveys to collect microbiological occurrence data at smaller PWSs to determine the correlation with the data collected at PWSs serving at least 100,000 people. These sample surveys will be conducted at PWSs using surface water serving (1) 10,000 to 100,000 people and (2) less than 10,000 people. A secondary purpose of these sample surveys will be to collect occurrence data for areas where no PWSs will be collecting microbiological occurrence data because there are no PWSs serving at least 100,000 people that use surface water (e.g., the upper Great Plains and Rocky Mountain areas). Selected PWSs would agree to sample voluntarily and send samples to an EPA-approved laboratory; EPA will pay for analyses.

■ **We operate three water treatment plants at our utility. One of them is a brand new ozone facility that was started up in July 1995. The other two are conventional facilities which have been in operation for years. Which plants have to be sampled for the ICR?**

Certainly, the two conventional plants have to be sampled for the ICR. The new facility is another matter. The final rule states: "Treatment systems or treatment plants whose total operational lifetime is fewer than 12 calendar months as of December 1995 are not required to comply with (the ICR)." Therefore, a brand new plant that was just started up in 1995 does not have to comply with the ICR monitoring.

■ **Our utility just last year added ozone to our existing treatment plant. Do we have to sample that treatment plant under the ICR?**

Yes. Just adding a new unit process to an existing facility is very different from a brand new treatment plant. The modified treatment plant would have to comply with the ICR monitoring.

■ **Will EPA require a PWS to modify treatment if ICR results show high levels of DBPs or microorganisms in the PWS's water?**

EPA will not require any PWS to modify its treatment based on ICR analytical results. However, if a PWS uses analytical results to meet both ICR and other regulatory requirements (e.g., TTHMs/THM4), the PWS will be required to meet applicable

MCLs or treatment techniques. Also, PWSs may want to improve treatment process operations based on deficiencies identified during the ICR.

EFFECTIVE DATES

■ When does the rule become effective?

The rule is effective 35 days after its publication in the *Federal Register* on May 14, 1996; therefore, the effective date is June 18, 1996. The first action that PWSs must complete is responding to the Notice of Applicability, 35 days after receiving it from EPA. The Notice is tentatively scheduled to be mailed in June, so responses would be due in mid-July. The second action that PWSs must begin is treatment study applicability monitoring, which must begin 3 months after the rule is published in the *Federal Register*.

■ Why will the ICR no longer be effective after December 31, 2000?

The ICR requires limited monitoring—12 months of treatment study applicability monitoring, 18 months of DBP and microbiological monitoring and engineering data, and a year-long treatment study. The schedule in the rule anticipates that these actions will be completed by July 1999; once all required actions have been completed, there is no further need for the rule requirements to remain in the *Code of Federal Regulations*.

■ What if my system finishes its monitoring before December 31, 2000?

Once a PWS has completed all required monitoring and treatment studies and has submitted all required reports, it is no longer subject to the ICR (§141.141 (a)(1)).

AVAILABILITY

■ Is this rule available on the Internet? If so, what is the Internet address?

Yes; <http://www.epa.gov/OWOW/OGWDW/icrindex.html> is the Internet address for the ICR.

■ How can I get a copy of any studies cited in this rule?

Supporting documents, including references cited in the rule, are available for review at the EPA Drinking Water Docket (MC 4101), 401 M Street, SW, Washington DC 20460. For access to docket materials call (202) 260-3027 between 9:00 am and 3:30 pm (EST) for an appointment.

- **Does EPA have a list of water systems required to comply with the microbial monitoring, DBP monitoring, and/or precursor study requirements? If so, where can I obtain a copy?**

Yes, EPA has prepared a list of the public water systems it believes will have to comply with the ICR. There may be some systems that need to comply that have not been identified on this list. Information regarding this list, or a copy of the list, may be obtained by contacting the Safe Drinking Water Hotline at 800-426-4791.

SIGNIFICANCE OF THE ICR

- **Will the ICR constitute an unfunded mandate?**

"Unfunded mandates" refer to Federal requirements that State and local governments are required to administer. Because States are not required to implement the ICR, there is no unfunded mandate at the State level. Only if a PWS is publicly owned is there an unfunded mandate at the local level. EPA will not be providing financial assistance to PWSs required to monitor under the ICR.

- **What are the costs associated with the ICR? Will these costs affect large systems only or also small/medium-sized ones?**

EPA has estimated the costs for typical treatment plants as follows:

- Start-up activities
 - Surface water plants \$12,000
 - Ground water plants \$12,000
 - Purchased water plants \$12,000
- Microbiological monitoring
 - Surface water plants \$39,000
 - Ground water plants NA
 - Purchased water plants NA
- DBP and related monitoring
 - Surface water plants \$69,000
 - Ground water plants \$50,000
 - Purchased water plants \$50,000
- Data reporting
 - Surface water plants \$18,000
 - Ground water plants \$5,000
 - Purchased water plants \$5,000
- Bench- and pilot-scale treatment studies
 - Surface water plants \$271,000
 - Ground water plants \$259,000
 - Purchased water plants NA

Costs will apply to large systems (those serving at least 100,000 people) and ground water systems serving 50,000-99,999. Costs will vary from site to site based on such factors as treatment processes, plant complexity and size, and disinfectants used.

ANALYTICAL METHODS

■ How are microbial methods available?

Required microbial methods are listed in §141.143(b). Methods are available in *Standard Methods* (with several modifications noted in the rule) for total coliform, fecal coliform, and *E. coli* and in the *ICR Microbial Laboratory Manual* for *Cryptosporidium*, *Giardia*, and total culturable viruses. The EPA manual is available from NTIS and is on the Internet. PWSs covered by the rule will be mailed a copy of EPA's manual at no cost.

■ How are chemical methods available?

Required chemical analytical methods are listed in §141.142(b)(1), Table 7. Methods are available in *Standard Methods* (with several modifications noted in the rule) or EPA manuals. EPA manuals are available from NTIS. PWSs covered by the rule will be mailed copies of EPA's manuals at no cost. For further details consult the *DBP/ICR Analytical Methods Manual* (EPA 814-B-96-002).

■ I noticed in Table 7 of the Final ICR (Analytical Methods Approved for Subpart M) that the only EPA method for THMs is 551.2. We run 524.2 for our state reporting, but it would appear that we can't use this method (unless it is referenced under the 40 CFR section cited in the table). Have they changed the 40 CFR references from the 1993 book (because the 40 CFR references in Table 7 do not match the analyses in the table)?

The short answer is YES. The CFR references were updated in 1995. Method 524.2 is one of the approved methods for TTHM compliance monitoring according to 40 CFR Section 141.24(e). Approved methods were updated on December 5, 1994, and the changes appear in the July 1995 version of the CFR.

The ICR references Section 141.24(e) for THM methodology approved for ICR monitoring purposes. Any THM method listed in that section should be covered by the drinking water certification program. Labs that are certified under that program for TTHMs will be approved for ICR monitoring if they submit documentation to verify the certification. Method 551.1 is also cited in the ICR as an approved method for THM monitoring, but it is not yet approved for TTHM compliance monitoring and, therefore, is not covered under State certification programs.

- **Do you mean that if a THM method is specified in 40 CFR Section 141.24(e) that utilities can use the method for the ICR and their approval will be as a result of their certification by their primacy agency?**

40 CFR Section 141.24(e) says that Methods 502.2, 524.2, and 551 can be used for TTHM compliance monitoring. Labs that analyze samples for TTHM compliance monitoring **MUST** be certified through the State drinking water certification program.

For the ICR, EPA will approve laboratories to analyze samples using the same method(s) for which they are already certified under the drinking water certification program. The only thing these labs need to do to receive initial approval is to verify the certification with the ICR Lab Coordinator. (They can write to the Coordinator for information—EPA has two very simple forms that need to be filled out. First a registration form and then a Verification of State Certification/ Approval Form.) After the ICR 18-month monitoring period starts, they will be subject to all the performance evaluation (PE) study and QC requirements that are outlined in the *DBP/ICR Analytical Methods Manual*.

In other words, yes, initial approval to use Methods 502.2, 524.2, or 551 will be as a result of having State drinking water certification.

- **Then, if they are using a non-CFR approved method (e.g., 551.1), they will have to get approval from EPA?**

Yes! The only method for THMs that is NOT covered in 40 CFR Section 141.24(e) is Method 551.1.

- **Is it only a difference in the way they apply to you? If the method is approved by the certification agency, they just have to cite that and if it is 551.1, they have to do something else (like what?).**

For Method 551.1, the laboratory will have to pass at least one PE study AND submit an application that includes method performance data. (Presumably, the same types of requirements were placed on the labs using Methods 502.2, 524.2, and 551 when they applied for drinking water certification. EPA is not asking for duplication of what was done under the certification program.)

DEFINITIONS

- **What are HAA5/HAA6? How many haloacetic acids are involved under this rule, 5 or 6?**

HAA5 (haloacetic acid-five) is the sum of mono-, di-, and trichloroacetic acid and mono- and dibromoacetic acid. HAA6 (haloacetic acid-six) is the sum of HAA5 plus bromochloroacetic acid. EPA proposed an MCL for HAA5 as part of the D/DBP Rule (69 *FR* 38668, July 29, 1994) and has provisions for avoiding treatment studies based in part on low levels of HAA5. During the ICR, PWSs must collect occurrence

data for HAA6 and report levels of individual haloacetic acids. In addition, PWSs may analyze for and report three additional haloacetic acids: tribromoacetic acid, dibromochloroacetic acid, and bromodichloroacetic acid.

MONITORING

GENERAL

■ When will the monitoring start?

Detailed monitoring of treatment plants and distribution systems is required to begin for each utility in the month following the receipt of approval of their initial sampling plan. Most utilities will have to begin monitoring in early 1997. However, all utilities serving > 100,000 and all ground water systems serving > 50,000 and < 100,000 who are subject to the ICR will have to begin monitoring for TOC by September 30, 1996 (see July 24, 1996, William Diamond letter).

■ I heard something about monitoring for TOX and trihalomethanes beginning in August 1996. What is this all about?

Utilities must begin monitoring for UFCTOX or THM4 and HAA5 3 months after publication of the final rule in the *Federal Register* if they want to try to meet criteria for avoiding treatment studies, for running joint studies, or for contributing to a research fund. See the final ICR for details and a definition of UFCTOX.

■ We have two sources of supply for my treatment plant. Must we sample both sources for pathogens?

No. You may sample and analyze the blended source waters as they enter the plant and analyze that sample for pathogens. If it is not possible to sample a blended source, sample the source with the highest expected pathogen concentrations. If each source is pretreated individually with chemicals, it is permissible to obtain a flow composite sample of the two sources prior to any pretreatment.

Microbial Monitoring

■ Is it possible to not have to monitor for viruses in the source of supply?

Utilities may monitor for total coliforms, fecal coliforms, or *E. coli* in the plant influent, at least 5 days/week for 6 consecutive months after January 1, 1994; if 90 percent of all samples contain <100 total coliforms/100 mL, or <20 fecal coliforms (or *E. coli*)/100 mL, a utility may request to not conduct influent virus monitoring for that plant. If a utility must sample for viruses they must collect a full 18 months of virus samples (with no provisions for reduced monitoring).

■ **Which utilities must conduct finished water monitoring for all pathogens?**

Utilities must conduct finished water monitoring for all pathogens and coliforms if they detect in the influent 10 or more *Giardia* cysts, or 10 or more *Cryptosporidium* oocysts, or one or more total culturable viruses, per liter of water (or their detection levels are very high).

■ **Is there a way to qualify for reduced monitoring for *Giardia* and *Cryptosporidium* in finished water?**

Utilities may perform the following as an alternative to *Giardia* and *Cryptosporidium* monitoring in finished water:

- Measure particle counts in influent, before filters and after filters; monthly for 18 months, AND
- Collect 4 consecutive months of *Giardia* and *Cryptosporidium* at influent, before filters and after filters, within first 12 months of sampling.

■ **Do we have to monitor for *Clostridium perfringens* and coliphage under the ICR?**

PWSs do not have to monitor for *Clostridium perfringens* and coliphage under the ICR.

■ **Does EPA allow particle counting in lieu of *Cryptosporidium* and *Giardia* monitoring for finished water?**

EPA has included specific provisions for particle counting in lieu of finished water protozoan monitoring in the final rule in §141.143(a)(2)(iii). In addition to particle counting, PWSs must conduct protozoan analyses at several locations in the treatment plant for at least 4 of the 18 months of particle counting.

■ **Do we have to wait for EPA to approve our sampling plan before starting the TOC monitoring?**

Treatment studies applicability TOC monitoring is required to before September 30, 1996. This monitoring will begin before EPA approval of sampling plans.

■ **Is reduced monitoring an option for microbial contaminants under the ICR? Can systems avoid some or all microbial monitoring? Under what conditions? Who decides?**

Microbial monitoring is required at treatment plants that treat surface water but not at those that treat only ground water. PWSs that demonstrate low levels of total coliform, fecal coliform, or *E. coli* in source water and that have approval from EPA may avoid total culturable virus monitoring under the provisions of §141.143(a)(2)(iv). EPA has included specific provisions for particle counting in lieu of finished water

protozoan monitoring in §141.143(a)(2)(iii). There are no other provisions for reduced microbial monitoring.

■ **Our PWS does not operate 3 months of the year. How do we conduct microbial monitoring for 18 consecutive months?**

There are probably no PWSs that do not operate for 3 months of the year that are subject to the ICR. There are probably a number of treatment plants that do not operate for some part of the year, however, because of maintenance, upgrades, decreased demand, or other reasons. For these plants, the general requirement is to collect an influent microbial sample for 18 months, even when the plant is not operating. [§141.141(d)]

■ **What about multiple intakes?**

Specific locations for sampling will be finalized as part of EPA's review and approval of the sampling plan prepared and submitted by the PWS. General requirements for DBP and related monitoring include the following:

- Take a sample at the upstream end of the treatment plant where waters from all intakes are blended before any treatment or chemical addition.
- For treatment plants that have multiple intakes and that add chemicals at the intake, the sample of treatment plant influent shall be a flow proportional composite of intake samples collected before chemical addition and before pretreatment.
- If the intakes are expected to have the same source water quality, one representative intake sample may be taken.
- If a disinfectant is added at or before the intake (e.g., for zebra mussel control) the sample shall be taken in the vicinity of the intake so that the sample is not contaminated by the disinfectant.
- A sample of treatment plant influent for a PWS that treats purchased finished water is taken at a location just before the purchased finished water is treated.
- An intake sample is collected after the intake but before blending with waters from other intakes and before adding chemicals or performing any treatment.

General requirements for microbial monitoring include the following:

- A sample of treatment plant influent shall be taken at a location at the upstream end of a treatment plant where waters from all intakes are blended before any treatment or chemical addition.
- For treatment plants that have multiple intakes and add chemicals at the intake, the PWS shall take an intake sample of the water resource with the

poorest microbiological quality (or, if that cannot be determined, the water resource with the highest flow) collected before chemical addition and before pretreatment.

- If the intakes are expected to have the same source water quality, one representative intake sample may be taken.
- If a disinfectant is added at or before the intake (e.g., for zebra mussel control), the sample shall be taken in the vicinity of the intake in such manner that the sample is not contaminated by the disinfectant.

■ **We detected viruses in our finished water samples—what do we do next?**

If viruses are detected in finished water samples, the PWS is required to submit archive samples of both treatment plant influent and finished water to EPA until 18 months of treatment plant influent microbial monitoring are completed. [§141.143(b)(3)(1)] Additionally, if viruses are detected in treatment plant influent samples at a density of at least 10 viruses/L, the PWS is required to submit archive samples of both treatment plant influent and finished water to EPA until 18 months of treatment plant influent microbial monitoring are completed. [§141.143(b)(3)(ii)]

■ **Are we allowed to avoid virus sampling if no viruses are detected in the first 12 months of sampling?**

In the proposed ICR, there was a provision for allowing PWSs that did not detect viruses in the first 12 months of monitoring to avoid subsequent virus monitoring. That provision is not in the final rule and virus monitoring is required for 18 months.

DBP MONITORING

■ **We receive treated water from City A that we do nothing else to, and we have wells that we chlorinate. Do we have to comply with all of the DBP monitoring requirements?**

For those wells that you chlorinate, you will have to meet all of the DBP monitoring requirements. You do not have to sample the treated water you receive as long as you do not treat it in any way that affects the levels of the DBPs in that supply. For example, treatment is considered to be simple chlorination, GAC filtration, or the addition of any other disinfectant such as chlorine dioxide or ozone.

■ **We receive treated water from City A, and we rechlorinate that supply and sell it to our retail customers. Do we have to comply with all of the DBP monitoring requirements?**

Yes. You have to monitor for all DBPs associated with sampling points “at or subsequent to the entry point to the distribution system.”

- **We receive treated water from another utility and we rechlorinate it and sell that water to other cities. We are just the middleman in the transaction. Surely, we do not have to sample for DBPs.**

You have to monitor for all DBPs at the sampling points that will be identified for you.

- **What is the sampling frequency for TOC?**

Treatment study applicability monitoring is required for 12 months. In addition, there are requirements for TOC monitoring as part of DBP and related monitoring under §141.142. This monitoring is required for 18 months, beginning the month after the PWS receives approval of its sampling plan from EPA.

- **Is reduced monitoring for DBPs an option under the ICR? Can systems avoid some or all of the DBP monitoring? Under what conditions? Who decides?**

There are no provisions for reduced monitoring for DBPs.

- **What about multiple intakes?**

There are provisions for compositing treatment plant influent for treatment plants that use multiple intakes. Proper procedures and locations will be approved by EPA as part of the Agency's review and approval of the sampling plans submitted by PWSs before commencing microbial and DBP and related monitoring.

- **Can systems composite?**

There are provisions for compositing treatment plant influent for treatment plants that use multiple sources. Proper procedures and locations will be approved by EPA as part of the Agency's review and approval of the sampling plans submitted by PWSs before commencing microbial and DBP and related monitoring.

PRECURSOR STUDIES

- **What is the bench-scale treatment study; is there a guidance manual available on it? What is the pilot testing treatment study; is there a guidance manual available on it?**

Bench- and pilot-scale treatment studies are defined in the *ICR Manual for Bench- and Pilot-scale Treatment Studies* (EPA 814-B-96-003). This rule-by-reference document contains specific legal requirements about the details of the treatment studies (e.g., the protocols that can be used, the number and type of samples that must be collected), and this document also contains guidance to assist PWSs in meeting the treatment study requirement.

Treatment studies must evaluate either GAC or membrane processes (nanofiltration or reverse osmosis) on either the pilot- or the bench-scale using the following protocol(s): one protocol for bench-scale GAC studies (RSSCT); one protocol for

pilot-scale GAC studies (continuous flow columns with a minimum column diameter of 2 inches); three protocols for bench-scale membrane studies (RBSMT, SEBST, and a long-term single element bench-scale study); and one protocol for pilot-scale membrane studies (a staged membrane system with a minimum configuration of a 2-1 array with at least three elements per pressure vessel). The protocols are located in Part 1 of the Treatment Study Manual—Section 4.0, pages 1-13 to 1-18 and Tables 4-1 and 4-2.

■ **How do PWSs decide which study (bench or pilot) to perform? What are the options? Advantages?**

Treatment plants required to conduct treatment studies with a total population served of 500,000 or more are required to conduct pilot-scale studies. Plants that serve less than 500,000 people can conduct either pilot- or bench-scale studies. In most cases, more information will be gained from a pilot study, but pilot studies are typically more expensive than bench studies and must be conducted onsite. (See Part 1 of the Treatment Study Manual—Section 3.3, pages 1-8 to 1-9, and Section 5.2.1, page 1-20.)

■ **Is there any way to avoid these studies? If so, what are the requirements for avoiding treatment studies? Our system is already using full-scale GAC technology, do we have to conduct treatment studies?**

Plants can avoid treatment studies if they meet the following criteria:

- The plant treats surface water and has an average influent TOC less than 4.0 mg/L based on 12 months of monitoring.
- The plant treats only ground water and has an average finished water TOC less than 2.0 mg/L based on 12 months of monitoring.
- The plant uses only chlorine as a primary and residual disinfectant and has (as an annual average of four quarterly averages) levels of THM4 less than 40 µg/L and HAA5 less than 30 µg/L in the distribution system.
- Per Section 3.2 and Table 3-2 of the *Treatment Study Manual*, plants already using full-scale GAC or membranes (nanofiltration or reverse osmosis) do not have to conduct treatment studies if the processes meet certain minimal requirements and conduct monitoring around the GAC or membrane process as part of the 18-month ICR monitoring.
- Plants that have already conducted precursor removal studies may grandfather data from that study or studies to meet the requirements of the ICR. EPA will review this grandfathered data to ensure that they were obtained using a testing protocol similar to one of those listed in the *Treatment Study Manual* (using the analytical methods described in the DBP Manual) and that the data meet all the requirements of the ICR and are supplied to EPA in a specified format.

- Plants can also buy out of the treatment study requirement by contributing funds to a research effort (see Section 3.6, page 1-10 and Section 5.2.5, page 1-22 of the Treatment Study Manual).

(Information located in Part 1 of the Treatment Study Manual, Section 3.2, pages 1-6 to 1-8 and Section 5.2.2, pages 1-20 to 1-21.)

- **We are a ground water system with an average TOC level of 1.5 mg/L in our finished water in 12 consecutive months. Do we have to conduct treatment studies?**

The PWS must conduct 12 months of TOC monitoring beginning before September 30, 1996. If the results of that monitoring show an average TOC level of 1.5 mg/L, the PWS would be able to avoid a treatment study. No provision exists for grandfathering TOC analytical results and using such results for avoiding treatment studies.

- **Are there any alternatives to precursor studies?**

In lieu of conducting the required treatment study, a PWS may apply to EPA to contribute funds (i.e., buy-out option) to a cooperative research effort. The PWS must submit an application to EPA Technical Support Center, ICR Precursor Removal Studies Coordinator, 26 W. Martin Luther King Drive, Cincinnati, OH 46268.

The treatment plant for which the waiver is sought must use a common water resource that is being studied by another PWS or cooperative of PWSs operating treatment plants in the same size category. A PWS operating treatment plant serving a population of less than 500,000 may also contribute to this fund if there is a common water resource treatment plant serving 500,000 or more conducting a treatment study. If EPA approves the application, the PWS contributes funds to the Disinfection Byproducts/Microbial Research Fund, to be administered by the American Water Works Association Research Foundation (AWWRF) under the direction of an independent research council, for use in a dedicated cooperative research program related to disinfectants, disinfection byproducts, and enhanced surface water treatment. [§141.141(a)(5)]

- **How much contribution do we make if avoiding treatment studies?**

The PWS must contribute \$300,000 for a treatment plant with a population served of 500,000 or more and \$100,000 for a treatment plant with population served of less than 500,000. The PWS must send the contribution to the address specified in EPA's approval letter not later than 90 days after EPA approves the PWS application for waiver of the treatment study. [§141.141(e)(5)(i) and (ii)]

- **Can precursor studies be conducted jointly between two or more PWSs? If so, under what conditions?**

Yes, if the plants operated by different PWSs demonstrate that they use a common source (Section 3.6), are of similar size (either serve a population greater than or

equal to 500,000 or serve a population less than 500,000), and use similar treatment processes (see Part 1 of the Treatment Study Manual, Section 3.4, pages 1-9 to 1-10; Section 3.6, pages 1-11 to 1-12; Section 5.2.4, pages 1-21 to 1-22; and Section 5.3, pages 1-23 to 1-24).

- **What is the minimum number of treatment studies to be conducted in a joint study?**

This depends on the sizes of the cooperating plants and the number of cooperating plants, as shown in Tables 3-3 and 3-4 in Part 1 of the Treatment Study Manual (see Part 1 of the Treatment Study Manual, Section 3.4, pages 1-9 to 1-10).

- **Can a system grandfather results?**

A PWS that has already evaluated precursor removal by either membranes or granular activated carbon may apply to EPA to allow that previous evaluation to be grandfathered for use in lieu of a treatment study. [§141.141(e)(6), §141.141(e)(7)(iv)] There are no other provisions for grandfathering results.

COMPUSERVE ACCESS

- **I have a CompuServe account and I am using WinCIM but I cannot find the Drinking Water Section. How do I get there?**

Sign on to CompuServe. Click on the "green traffic light" icon at the top of the screen (Go...). In the box type "earth" and click OK. You will be transferred to the Earth Forum. Sign up as a member by clicking the "Join" button. To get to the Drinking Water Section, click on the icon on the right that looks like several pieces of paper. When you are offered a list of sections, choose "Drinking Water" and you will be shown a list of messages related to drinking water issues and the ICR. You can download and read any of the messages and reply to them if you wish. If you want to post a message, click on the icon of a hand writing on a piece of paper. Make sure that you send it to the Drinking Water Section. Check out the Drinking Water Section Library contents by clicking on the "books" icon on the right and choosing "Drinking Water." You can download any of the files in the library for your use.

- **I am member of AOL and I also have an Internet account. Can I access the Drinking Water Section using these systems?**

To access the Drinking Water Section, you must be a member of CompuServe. Limited ICR information will be available on AWWA's Web page, which can be accessed at <http://www.awwa.org>.

- **How can I become a member of CompuServe?**

Call 800-524-3388 and ask for representative 190. This will entitle you to a free starter kit including WinCim, which is the software you can use to access CompuServe. You will also receive a free month of service and other benefits. If you

want more information on this, read the Aqualink column from June 1994 in the AWWA Journal, page 10.

WATER UTILITY DATABASE SYSTEM

■ **Is it recommended that a PC should be dedicated solely for the ICR program?**

No. It is not necessary to dedicate a PC to the ICR program. Utilities should be able to use a PC for the ICR data recording needs as well as other word processing and other computing functions.

■ **Can one PC be used for multiple sites?**

Yes. There are narrowly defined options for using multiple PCs to capture data from multiple sites. The *ICR Water Utility Database System Users' Guide*, which utilities will be receiving with copies of the software, describes these options. In all cases, utilities must use only ONE copy of the software application. The simplest option which has the least chance of corrupting the data is to have all of the data from multiple sites transmitted on paper forms to one person who will enter it on one PC.

■ **Is written notification of sampling and/or treatment plant changes necessary after the submission of the Initial Sampling Plan?**

No. Once the Initial Sampling Plan has been submitted and accepted by EPA, monthly changes in sampling or treatment processes are simply entered into the software.

LABORATORY APPROVAL/PE STUDIES

■ **What is the approval process for the general water quality parameters (pH, alkalinity, disinfectant residuals, temperature, turbidity, calcium hardness, total hardness, and ammonia)?**

Laboratories will be approved to perform these analyses if they are currently certified or approved by a State agency for the same analytical method OR they are performing these analyses (same method) on water samples and the data are being reported to and accepted by a State agency. To receive this approval the laboratory must write to:

ICR Laboratory Coordinator
EPA – Technical Support Center
26 W. Martin Luther King Drive
Cincinnati, OH 45268
FAX: 513-569-7191

The letter can be a one sentence request. There is no need to list the parameters for which the lab is requesting approval. EPA will then send the laboratory an

informational package that includes a registration sheet. The laboratory will check which analyses it plans to perform for the ICR and return the sheet to EPA.

EPA will next send the laboratory a "Verification of State Certification/Approval" sheet that is used to document which methods are being used, the state in which the lab is certified/approved, and the type of certification/approval. This information and a copy of the certificate from the state are submitted to EPA.

■ **What parameters will be included in the next ICR Chemistry PE Study?**

TOC, UV254, TOX, THMs, HAA, HANs.

TREATMENT TRAIN ISSUES

■ **Do chlorine booster stations in the distribution system count as additional treatment for monitoring purposes?**

No. Chlorine booster stations in the distribution system are not counted as additional treatment plants. There is a place in the software to list the number and type of disinfectant booster stations in the distribution system, but that is all the information requested on these facilities.

■ **We add hypochlorite in distribution system booster stations. Do we have to analyze the hypochlorite stock solution?**

No. You only need to analyze the hypochlorite stock solution if hypochlorite is used in a treatment plant.

■ **We use several tanks of sodium hypochlorite in our treatment plant. Which one do we sample for the required analyses?**

If a utility uses more than one hypochlorite stock solution in the treatment plant, a composite sample of the various stock solutions must be obtained and submitted for analysis. (From the ICR Sampling Manual)

■ **Must a tracer study be run on all unit processes as a requirement of the ICR?**

A one-time tracer study must be run only on the plant clearwell. For unit processes other than a clearwell, a utility can estimate the T10 value.

■ **When is a clearwell not a clearwell? In other words, is it necessary to run a tracer study on a "clearwell" that is on a sidestream to the main flow of a treatment plant?**

A clearwell is not a clearwell for the purposes of running a tracer study when it is a regulating reservoir without continuous flow-through that is not used to achieve CT credit.

Section 3:

ICR Water Utility Database System Summary



ICR Water Utility Database System Summary

What is the ICR Water Utility Database System?

The ICR Water Utility Database System is a personal computer (PC)-based Microsoft® Access™ runtime application developed to enable water utilities to meet the requirements of the ICR. It is distributed by EPA to the designated ICR Technical Contacts, who should have received the software and users' guide with the Notification Letter sent by EPA in June 1996.

Several test versions of the software were released during the development of the ICR Water Utility Database System. Do not use these versions—you must use Release 1.0 or the most recent version of the software to report required data to EPA.

The software application helps you to record and review the data you must report under the ICR, to verify that the data you send to EPA are correct and complete, and to report your data in the format specified by EPA.

Purpose of the ICR Water Utility Database System

The ICR Water Utility Database System is part of the overall ICR Data Management System (DMS), an information system that captures treatment process, water resource, and sample data from approximately 350 PWSs. EPA and the water industry will use these data to evaluate the quality of drinking water in the United States, identify the most effective water treatment technologies currently in use, and develop future drinking water regulations.

Users' Guide and Data Entry Video

The *ICR Water Utility Database System Users' Guide* accompanies the software and helps you use it; the guide describes the information to be entered into the application. It also contains detailed instructions for using the application—how to install and start the software, how and when to enter data into the system, how to generate reports on the data in the system, and how to submit data to EPA.

EPA has also developed and will distribute *An Introduction to the ICR Water Utility Database System*, a data entry video that provides an overview of the ICR Water Utility Database System to supplement the information in the Users' Guide. The video also familiarizes you with the application before you attend the AWWA Training Sessions

(described in more detail in Section 4). If you have not received the software and the Users' Guide, please refer to Section 5 for a listing of additional ICR-related references.

What Equipment Do You Need?

The ICR Water Utility Database System was developed to run on the following computer hardware with the following specifications:

- IBM-compatible PC with an 80486 or Pentium™ Microprocessor
- 40 megabytes free space on an attached hard disk drive
- 3.5" high-density diskette drive
- VGA or compatible display set to a resolution of 600 × 800 pixels
- 16 megabytes or more Random Access Memory (RAM)
- Mouse or comparable pointing device
- 300 dot per inch (standard laser) or higher resolution printer to output reports generated by the application.

The application will run on an IBM-compatible PC with 80386 microprocessor and 8 megabytes RAM, but system performance will decrease markedly.

You will also need the following software:

- MS-DOS™ Version 5.2 or later (or compatible operating system).
- Microsoft® Windows™ Version 3.1 or later. (Note: the ICR Water Utility Database System was not designed to run under Microsoft Corporation's Windows 95™. If you choose to use Windows 95™, you may encounter errors caused by incompatibilities with the new operating system.)
- The ICR Water Utility Database System.

The ICR Water Utility Database System is a Microsoft® Access™ runtime application. You do not have to purchase a copy of Microsoft® Access™ to use the ICR Water Utility Database System. Using just the runtime application, you can enter data and print predefined reports.

ICR DMS E-Mail/Hotline

Refer any specific questions you have about using the ICR DMS application to the ICR DMS Hotline at (703) 908-2155. You can also reach Hotline staff via E-mail at 102351.2062@compuserve.com.

Technicians on the ICR DMS Hotline can answer questions only about using the ICR Water Utility Database System and the Laboratory Quality Control (QC) Database System (which is described in Section 7). If you have questions about implementing or interpreting the rule, the technicians will refer you to AWWA's A-Team or the EPA's Safe Drinking Water Hotline (see Section 4).

Section 3: ICR Water Utility Database System Summary

Please refer to the *ICR Water Utility Database System Users' Guide* and data entry video for detailed instructions on how to install and use the ICR Water Utility Database System. All monitoring data must be entered into this application and submitted on diskette to EPA to meet the requirements of the ICR.

Where Do You Submit Diskettes?

PWSs must submit all microbial and DBP and related monitoring analytical reports on diskette to EPA at the following address:

USEPA (ICR 4600)
ICR Data Center
Room 1111 East Tower
401 M Street, SW
Washington, DC 20460.

EPA is developing the Laboratory Quality Control (QC) Database System software (similar to that developed for the utilities) to be used by the approved laboratories to report QC data to EPA. EPA will provide the software to all laboratories. Laboratories can call the ICR Data Management System Hotline at 703-908-2155 for assistance with the software.

[Note: Laboratories do not report analytical results directly to EPA, only to the PWS.]



Section 4:

EPA and AWWA A-Team Support Services



EPA and AWWA A-Team Support Services

In addition to the reference manuals developed to assist PWSs with implementation of the ICR, EPA and AWWA have established the following technical support services.

AWWA A-Team

AWWA has assembled the A-Team to help PWSs comply with the ICR. The A-Team consists of drinking water experts who provide support to utilities in designing sample collection systems and inputting that data. A-Team members can be reached via phone or CompuServe.

Phone: (800) 200-0984

Internet: 103327.2057@compuserve.com

CompuServe is a worldwide on-line communications service that can be accessed by anyone who has a personal computer, a modem, and a telephone line. To obtain a CompuServe account, call 1-800-524-3388 and ask for representative 190. By calling this number, you will receive a free starter kit.

Utilities with questions about the ICR can communicate through the Drinking Water Section (DWS), which is part of the Earth Forum, one of CompuServe's larger electronic bulletin boards. The DWS library contains a number of files that will be useful to utilities affected by the ICR. These files include the full text of the *Federal Register* version of the ICR, an outline of the ICR with page locators for the *Federal Register* version, and graphics files showing sampling sites for typical treatment process trains.

Utility employees with CompuServe memberships can log onto the Earth Forum/DWS and post messages asking specific questions; an A-Team member assigned to monitor the DWS will post a response linked to that question. However you leave a message, an A-Team member will answer your question as soon as possible. It is very important that you give as much detail as possible in your message. Please do not leave messages at more than one service (i.e., do not leave a voice mail and leave a message on CompuServe); it takes more time for the A-Team to respond.

ICR Water Utility Database System Training

AWWA is also offering training courses in the fall of 1996 for people interested in the ICR and the ICR Water Utility Database System. The training courses will cover the following topics:

- Describe the goals, basic principles, and importance of the ICR
- Describe how the ICR requirements relate to the interpretation of the ICR sampling schematics and data entry needs
- Explain the basic sampling requirements
- Demonstrate how to use the ICR Water Utility Database System and how to enter data
- Describe the ICR Initial Sampling Schematics and how to create and modify initial sampling plans
- Demonstrate how to print necessary reports to verify data entry and perform quality assurance/quality control (QA/QC)
- Describe how to submit data
- Explain how to access the ICR DMS Hotline and request assistance from the A-Team.

Training courses are planned during September and October 1996 for the following locations:

- Los Angeles, CA
- San Francisco, CA
- Washington, DC
- Miami, FL
- Chicago, IL
- Boston, MA
- St. Louis, MO
- Dallas, TX.

Please call Rick Merrill at (303) 347-6185 for specific dates and to enroll in the course.

ICR Laboratory Software Training

AWWA is planning training sessions on the ICR laboratory software. The software is scheduled to be completed in November and training sessions will likely be held in early 1997.

Please call Rick Merrill at (303) 347-6185 for specific dates and to enroll in the course.

Safe Drinking Water Hotline

If you require help in implementing the ICR or in understanding EPA's ICR policies and guidelines, contact the Safe Drinking Water Hotline by telephone at 800-426-4791 or via E-mail at HOTLINE-SDWA@EPAMAIL.EPA.GOV.

Section 4: EPA and AWWA A-Team Support Services

Additionally, the documents EPA has developed to assist you with implementation of the ICR are available through the Hotline. These documents are listed in Section 5 of this reference manual.



Section 5:

Summary of Additional References



Summary of Additional References

Reference	Contents	How to Obtain
Rule		
National Primary Drinking Water Regulations: Monitoring Requirements for Public Drinking Water Supplies: <i>Cryptosporidium</i> , <i>Giardia</i> , Viruses, Disinfection Byproducts, Water Treatment Plant Data and Other Information Requirements, 40 CFR Part 141 Federal Register Notice published May 14, 1996 (61 FR 24354)	ICR rule language for ICR requirements.	SDW Hotline (800) 426-4791
Rule by Reference		
ICR Sampling Manual NTIS PB96-157508 EPA 814-B-96-001	Defines the sampling, notification, and applicability requirements of the ICR.	NTIS (800) 553-6847 SDW Hotline (800) 426-4791
DBP/ICR Analytical Methods Manual NTIS PB96-157516 EPA 814-B-96-002	Defines the analytical methods and laboratory approval criteria for the DBP parameters in the ICR.	NTIS (800) 553-6847 SDW Hotline (800) 426-4791
ICR Manual for Bench-and Pilot-scale Studies NTIS PB96-157524 EPA 814-B-96-003	Defines ICR Treatment Studies requirements.	NTIS (800) 553-6847 SDW Hotline (800) 426-4791
ICR Microbial Laboratory Manual NTIS PB96-157557 EPA 600-R-95-178	Defines the analytical methods and laboratory approval criteria for the microbiology parameters in the ICR.	NTIS (800) 553-6847 SDW Hotline (800) 426-4791
Reprints of EPA Methods for Chemical Analyses Under the Information Collection Rule NTIS PB96-157532 EPA 814-B-96-006	Contains copies of EPA methods for the ICR.	NTIS (800) 553-6847 SDW Hotline (800) 426-4791
Data System Guides		
ICR Water Utility Database System Users' Guide NTIS PB96-501671 EPA 814-B-96-004	Helps the affected water systems to meet ICR reporting requirements.	NTIS (800) 553-6847 SDW Hotline (800) 426-4791
ICR Laboratory Quality Control (QC) Users' Guide NTIS PB96-501689 EPA 814-B-96-005	Helps approved laboratories to meet ICR reporting requirements.	NTIS (800) 553-6847 SDW Hotline (800) 426-4791
ICR Treatment Study Reporting Diskette	Used to report results of ICR treatment studies.	SDW Hotline (800) 426-4791
Videos		
An Introduction to the ICR Water Utility Database System EPA 814-V-96-004	Presents an overview of the ICR Water Utility Database System Software.	SDW Hotline (800) 426-4791

Section 5: Summary of Additional References

Reference	Contents	How to Obtain
Videos (continued)		
Protozoa Video and Companion Guide: ICR Protozoan Method for Detecting <i>Giardia</i> Cysts and <i>Cryptosporidium</i> Oocysts in Water by a Fluorescent Antibody Procedure EPA 814-V-95-003	Used with the ICR Microbial Laboratory Manual to train on the ICR protozoa method.	SDW Hotline (800) 426-4791
Virus Video and Companion Guide: Virus Monitoring Protocol for the Information Collection Rule EPA 814-V-95-002	Used with the ICR Microbial Laboratory Manual to train on the ICR virus method.	SDW Hotline (800) 426-4791
Sampling Video and Companion Guide Information Collection Requirements Rule - Protozoa and Enteric Virus Sample Collection Procedures EPA 814-V-95-001	Used with the rule requirements and manuals to train on the sampling method for virus and protozoa for the ICR.	SDW Hotline (800) 426-4791
Fact Sheets		
Information Collection Rule Summary for the Public EPA 811-F-96-001	Provides overview of ICR Rule.	SDW Hotline (800) 426-4791
Information Collection Rule: Key Issues EPA 811-F-96-003	Discusses strategy for protozoan data, implementation schedule, and research plan.	SDW Hotline (800) 426-4791
Information Collection Rule Technical Summary EPA 811-F-96-004	Summarizes rule requirements for water systems and other informed audiences.	SDW Hotline (800) 426-4791
EPA Efforts to Control Microbial and Byproduct Risk EPA 811-F-96-005	Summarizes rules from reg-neg: ICR, Interim Enhanced Surface Water Treatment Rule, and Disinfectants/Disinfection Byproducts Rule.	SDW Hotline (800) 426-4791
ICR Optional Public Notice Language for <i>Cryptosporidium</i> EPA 811-F-96-007	Describes optional public education/notice language, including example language.	SDW Hotline (800) 426-4791
ICR Implementation Fact Sheet #1 - Implementation Requirements EPA 814-F-96-001	Summarizes ICR implementation requirements.	SDW Hotline (800) 426-4791
ICR Implementation Fact Sheet #2 - Laboratory Approval EPA 814-F-96-002	Summarizes ICR laboratory approval requirements.	SDW Hotline (800) 426-4791
ICR Implementation Fact Sheet #3 - Treatment Studies EPA 814-F-96-003	Summarizes ICR treatment study applicability monitoring and treatment study requirements.	SDW Hotline (800) 426-4791
Other		
Standard Methods for the Examination of Water and Wastewater (19th Edition, 1995)	Provides analytical methods in detail.	APHA 1015 15th Street, NW Washington, DC 20005
Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources (1990)	Filtration and disinfection requirements.	AWWA 666 W. Quincy Avenue Denver, CO 80235

Section 6:

ICR Technical Coordinator Responsibilities



ICR Technical Coordinator Responsibilities

A utility's designated ICR Technical Coordinator must have a working knowledge of plant operation, laboratory procedures, computer interfacing, data analysis, and the ICR rule. The coordinator answers questions for individuals performing specific functions within the plant and ensures that all ICR implementation responsibilities are fulfilled. The ICR Technical Coordinator may not perform each of the individual tasks personally but must ensure that they are done. Suggested oversight responsibilities of a utility's ICR Technical Coordinator include the following duties [adapted from *Journal of AWWA* 87:1:19 (1995)]:

General

- Coordinate the efforts of the utility to comply with the ICR requirements.
- Identify and plan for staff and monetary resource requirements needed to implement monitoring, reporting, and bench or pilot studies, if required.
- Ensure that the utility staff participating in implementation understands how individual tasks relate to the overall effort.
- Conduct planning sessions to coordinate implementation efforts.
- If needed, develop and secure contracts for outside services.
- Secure on-line communications through the Drinking Water Section on CompuServe or through an Internet E-mail provider.
- Prepare and coordinate execution of a communications and action plan to respond to public health concerns raised when contaminants are detected during ICR monitoring (e.g., detecting *Cryptosporidium* or viruses in treated water).
- Select and secure the services of a contract laboratory that has gained ICR approval status. Stay abreast of the approval status of ICR laboratories throughout the period in which the ICR is in effect.

Sampling Plan

- Evaluate treatment plant sampling requirements, determine where samples must be taken, and calculate which analyses must be performed.
- Seek guidance from the AWWA A-Team, if needed.

- Resolve any problems with sampling locations or protocols well in advance of the date sampling is required to begin.

Laboratory Analyses

- Determine which analyses the utility will perform and which one(s) a contract laboratory will do.
- Establish laboratory performance criteria using EPA-proposed criteria and reporting levels as a minimum.

Data Reporting

- Ensure that samples are collected correctly and reported accurately.
- Collect treatment plant design and operational data for reporting to EPA.

Time Estimate for ICR Technical Coordinator

The ICR Technical Coordinator will perform several tasks during the implementation of the ICR. AWWA's A-Team has estimated that the ICR Technical Coordinator will spend about 1,400 man hours over the course of the ICR implementation period. Approximately one-third of this time will be devoted to data entry and verification. Other major tasks will include PWS information collection for ICR Tables 6a-6e (**Exhibits 2-20 to 2-24** in this manual), laboratory coordination, and overall project management. The ICR Technical Coordinator also will handle several smaller tasks, including preparation of the ICR Initial Sampling Plan, coordination of samplers, and preparation of data transfer disks. A detailed breakdown of hours by task is presented in the August 1996 issue of the *Journal of American Water Works Association* (Volume 88, No. 8, p. 56).

Section 7:

Laboratory Approval Process for Microbiological and Chemical Laboratories



Laboratory Approval Process for Microbiological and Chemical Laboratories

ICR Laboratory Approval Process

EPA requires a national laboratory approval process for the ICR because the Regulation Negotiating Advisory Committee determined that data must conform to specific accuracy and precision requirements to meet ICR objectives. The committee also determined that, as a basis for ensuring useable data, EPA must develop a method of identifying laboratories qualified to perform the required analyses for PWSs. There are two separate and distinct laboratory approval processes, one for chemistry laboratories and one for microbiological laboratories.

PWSs must be sure to contract with an approved laboratory and have contracts in place by early 1997, when sampling starts. Most laboratories interested in participating in the ICR have already submitted applications to EPA. (See addresses below for the EPA contact to receive application forms.)

List of Approved Laboratories

Laboratory approval decisions will be based on EPA's review of completed application packages and performance evaluation (PE) study data. An initial list containing the names of "approved" laboratories will be mailed to applicable PWSs.

The lists for approved chemistry and microbial laboratories will be updated periodically (contact the Safe Drinking Water Hotline at 800-426-4791 for the most current list). The initial list of approved chemistry laboratories is available as of August 1996 and the initial list of approved microbiology laboratories is expected to be available in September 1996.

Laboratory Data System

EPA is developing the Laboratory Quality Control (QC) Database System software (similar to that developed for the utilities) to be used by the approved laboratories to report QC data to EPA. EPA will provide the software to all approved laboratories. Laboratories can call the ICR DMS Hotline at 703-908-2155 for assistance with the software.

ICR Laboratory Manuals

Five manuals are incorporated by reference into the ICR; they are available through the Safe Drinking Water Hotline (800-426-4791). Necessary details on the ICR laboratory

process, quality control requirements, approved monitoring methods, PE study requirements, minimal requirements for approval, and other subjects are given in two of the manuals—the *DBP/ICR Analytical Methods Manual* (EPA 814-B-96-002) and the *ICR Microbial Laboratory Manual* (EPA 600/R-95-178).

ICR Laboratory Approval for Chemistry

If a laboratory intends to perform chemical analyses during the 18-month monitoring period or to perform TOC monitoring to determine applicability for bench- and pilot-scale treatment studies, it must initiate the approval process by writing to EPA at the following address:

ICR Laboratory Coordinator (Chemistry)
EPA – Technical Support Center
26 W. Martin Luther King Drive
Cincinnati, OH 45268.

EPA will then send the laboratory a registration form on which the lab will indicate the analyses for which it is seeking approval. Upon receipt of the completed registration form, EPA will send a customized application package to the laboratory requesting information on the lab's qualifications and capabilities. This information will be used by EPA to review and evaluate the lab's qualifications. Onsite inspections may also be conducted on a subset of the laboratories seeking approval.

Laboratories that have State certification or approval to perform specific ICR analyses (e.g., pH, chlorine residuals, trihalomethanes) will be approved after they provide documentation to verify their certification/approval. Approval to perform ICR analyses not covered by State evaluation processes (e.g., HAA5, TOC) will be contingent on successful demonstration of capabilities through submission of an application and participation in PE studies.

PE Samples

The three rounds of ICR Chemistry PE Studies were completed by July 1996. These studies included the following parameters: THMS, HANS, CH, HAA5, TOX, TOC, UV, Br, ClO_2 , ClO_3 , and BrO_3 . Laboratories that receive approval to perform analyses for the ICR also must participate successfully in quarterly PE studies (beginning shortly before and continuing throughout the 18-month monitoring period).

Maintaining Chemistry Lab Approval

Laboratories with approval to perform general water quality analyses (e.g., pH, chlorine residual) based on State certification/approval are required to maintain State approval during the course of the 18-month monitoring period. Laboratories with approval to perform DBP, Br, TOC, and UV analyses must meet specific QC and PE study requirements during the 18-month monitoring period to maintain laboratory QC approval.

ICR Laboratory Approval for Microbiology

The current drinking water laboratory certification program does not address analyses for *Giardia*, *Cryptosporidium*, and total culturable viruses; therefore, EPA has developed a separate program for the ICR using the term "laboratory approval" rather than "laboratory certification." Laboratory approval will require (1) submission and acceptance of an application for approval, (2) satisfactory analysis of unknown PE samples, and (3) passing an onsite laboratory evaluation. The laboratory approval process for pathogen testing begins when the laboratory director makes a formal request for approval to EPA at the following address:

ICR Laboratory Coordinator (Microbiology)
EPA – Technical Support Center
26 W. Martin Luther King Drive
Cincinnati, OH 45268.

Requests may be made up to August 14, 1996 (3 months after promulgation of the final rule). Following receipt of requests for approval, EPA will send an application package to the laboratory.

- Only laboratories that meet the minimal facility, equipment, and personnel requirements described in the application package will be considered for approval.
- QC samples containing known *Giardia* cyst, *Cryptosporidium* oocyst, or virus concentrations will be provided to analysts requesting approval who have completed the application successfully. QC samples will be used as part of an ongoing approval process.
- Qualified laboratory personnel must satisfactorily analyze PE sample sets to become approved and subsequent PE sets for ongoing approval.
- A laboratory onsite evaluation will be conducted to evaluate the facilities and equipment of the laboratory and the analysts' ability to adhere to the monitoring protocols. The use of uniform methodology will make it possible to compare data generated by the different laboratories.

Laboratories that want to perform quantitative analyses for total coliforms and fecal coliforms or *E. coli* in source water and drinking water must provide validation of certification under the drinking water laboratory certification program. A Verification of State Certification form will be included in the application package for these laboratories to complete and forward to EPA.

Maintaining Microbiological Lab Approval

Laboratories with approval to perform general microbial analyses (e.g., coliforms, *E. coli*) based on State certification/approval are required to maintain State approval during the course of the 18-month monitoring period. Laboratories with approval to perform protozoa

Section 7: Lab Approval Process for Microbiological and Chemical Laboratories

and virus analyses must meet specific QC and PE study requirements during the 18-month monitoring period to maintain laboratory approval.